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The Canadian Field-Naturalist

Vol. 65 OTTAWA, CANADA, JANUARY-FEBRUARY, 1951 No. 1

CENTURIE DE PLANTES CANADIENNES — II [1, 2, 3]

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CET ARTICLE fait suite à un autre de la même série publié dans le Naturaliste Canadien 75: 79-84, 202-227. 1948-9.

Les herbiers consultés sont les suivants:

DAO Herbier de la Division de Botanique et Phytopathologie, Ottawa.

G Herbier Gray.

SASKP Herbier du Laboratoire Fédéral de Phytopathologie, Saskatoon, Saskatchewan.

SASKU Herbier W. P. Fraser, Université de Saskatchewan, Saskatoon, Saskatchewan.

SWC Herbier de la Station Expérimentale de Swift Current, Saskatchewan.

Pour plus de commodité le texte a été divisé en cinq parties: I—Ranunculaceae, II—Caryophyllaceae, III—Compositae, IV—Liliaceae, V—Etudes diverses. Sous chacunes de ces subdivisions, les genres et les espèces ont été distribués par ordre alphabétique.

Les distributions données dans cet article ne tiennent compte, généralement que des spécimens examinés par l'auteur. Ce sont donc des distributions minimales.

I — Ranunculaceae

LES VARIATIONS CANADIENNES DE L'ANEMONE MULTIFIDA POIRET

Un certain nombre de variations de cette espèce se rencontrent au Canada. La clef qui suit pourra servir à les identifier. En plus des variétés mentionnées ci-dessous, il existe aussi une variété *uniflora* DC. que je ne sais pas où placer.

E. Hultén ne considère pas comme distinctes les variétés *magellanica* et *hudsoniana*. Sans doute les trois variétés de DeCandolle étaient basées sur des caractères tout à fait inconstants: 3 fleurs (var. *magellanica*), 2 fleurs (var. *hudsoniana*) et 1 fleur (var. *uniflora*). D'après les spécimens à ma disposition, le var. *magellanica* se distingue par ses tépales jaune-citron sur les deux faces, longs de ± 15 mm, ovales à elliptiques, et par ses feuilles involucrales à folioles cunéaires un peu lobées, à lobes larges de 4-5 mm.

a. Tépales mesurant 1 cm ou moins. Plantes hautes de 3 dm ou moins.

b. Tépales blanchâtres intérieurement, généralement blanchâtres extérieurement ..... 1. var. *hudsoniana*

bb. Tépales colorés, rouges, pourpres, jaunâtres ou bleuâtres.

c. Tépales rouges ou pourpres sur les deux faces.

d. Tépales 5 par fleur ..... 2. var. *hudsoniana* f. *sanguinea*

dd. Fleurs doubles, tépales 12-14 par fleur ..... 3. var. *hudsoniana* f. *polysepala*

cc. Tépales bleuâtres extérieurement, généralement jaunâtres intérieurement ..... 4. var. *saxicola*

aa. Tépales de plus de 1 cm de longueur.

e. Grandes plantes hautes de (1.5)-4-5-(7) dm. Tépales 5 par fleur. Tiges à (1)-2-3-(5) fleurs.

f. Tépales rouges ou pourpres ..... 5. var. *Richardsiana*

ff. Tépales blancs ..... 6. var. *Richardsiana* f. *leucantha*

ee. Petites plantes hautes de 1-4 dm. Tépales (5)-6-9 par fleur. Tiges à 1-(2) fleurs.

g. Fleurs rouges ..... 7. var. *Sansonii*

gg. Fleurs blanches ou jaunâtres. ..... 8. var. *Sansonii* f. *galactiflora*

[1] Reçu pour publication le 20 juillet 1950.
[2] Contribution No 1042, Division de Botanique et Phytopathologie, Service Scientifique, Ministère de l'Agriculture, Ottawa, Canada.
[3] Ces études sont en partie basées sur des spécimens récoltés au cours d'explorations scientifiques conjointes organisées par les Divisions de Botanique et d'Entomologie du ministère canadien de l'Agriculture en coopération avec le Conseil des Recherches pour la Défense du Canada.

Vol. 64, No. 6, November-December, 1950, was issued February 10, 1951.

1—ANEMONE MULTIFIDA Poiret var. HUDSONIANA DC., Systema 1: 209. 1817. La variété la plus commune au Canada. Se rencontre au Nouveau-Brunswick, en Gaspésie et aussi depuis la baie d'Hudson et la baie Georgienne jusqu'en Alaska et en Colombie-Britannique. Aussi dans l'ouest des Etats-Unis, de même que dans le Vermont, le Maine, etc. Vicariant du var. *magellanica* DC. qu'on rencontre depuis le Chili jusqu'au cap Horn.

2—ANEMONE MULTIFIDA Poiret var. HUDSONIANA DC. f. SANGUINEA (Pursh) Fernald, Rhodora **19**: 141. 1917. Fréquent dans toute l'aire du var. *hudsoniana* et peut-être plus fréquent que la forme à fleurs blanches.

3—ANEMONE MULTIFIDA Poiret var. HUDSONIANA DC. f. POLYSEPALA Fernald, Rhodora **19**: 141. 1917. Connu seulement par la récolte type qui vient du comté de Gaspé, Québec.

4—ANEMONE MULTIFIDA Poiret var. **saxicola** var. n. Herba 2.0-3.5 dm alt. Flores (1)-2-3 in planta. Tepala 5 in flore, elliptica, 6-10 mm long., superne citrina vel rarius rubescentia, inferne coerulescentia.

ALBERTA: *B. Boivin 5005,* Banff Park, Mont Wilson, rocs dénudés le long d'un torrent de montagne, alt. ca. 1900 m., 27 juillet, 1946 (DAO, type); *J. T. Sexsmith 53,* Waterton National Park, Summit, Carthew Trail, shale slide, July 16, 1937 (DAO); *J. Fletcher,* Banff, Mt. Edith, July 8, 1902 (DAO); *B. Boivin 4937,* Banff Park, mont Coleman, lieux ouverts, alt. 1500-2000 m., 26 juillet, 1946 (DAO).

COLOMBIE-BRITANNIQUE: *J. Fletcher,* Mt. Cheam, Aug. 4-8, 1899 (DAO).

5—ANEMONE MULTIFIDA Poiret var. RICHARDSIANA Fernald, Rhodora **19**: 141. 1917. Gaspésie (d'après Fernald). Parmi les specimens à ma disposition, tous les specimens en fleur ont des fleurs blanches et appartiennent à la forme suivante:

6—ANEMONE MULTIFIDA Poiret var. RICHARDSIANA Fernald f. LEUCANTHA Fernald, Rhodora **19**: 141. 1917. Gaspésie, baie James, baie d'Hudson *(E. Lepage 15337,* près de Big Stones, Ont.; *P. Q. MacKinnon 21,* Churchill, Man.), les monts Cyprès en Saskatchewan *(W. Shevkenek; A. J. Breitung 4259)* et en Alberta *(R. H. Dixon 1785,* Pincher Creek).

7—ANEMONE MULTIFIDA Poiret var. **Sansonii** var. n. Planta 1.0-3.5 dm floribus solitariis rarius binis tepalis rubris ellipticis vel elliptico-lanceolatis, 11-15 mm, (5)-6-9 in flore.

ALBERTA: *N. B. Sanson,* Banff, Tunnel Mt., June 8, 1898 (DAO type).

COLOMBIE-BRITANNIQUE: *W. J. Reiley,* Hudson Hope, June, 1938 (DAO).

WYOMING: *C. L. Porter 3220,* Pole Mt., Albany Co., alt. 8300 ft., June 25, 1943 (DAO).

8—ANEMONE MULTIFIDA Poiret var. SANSONII Boivin f. **galactiflora** f.n. floribus lacteis vel interdum luteis.

ALBERTA: *N. B. Sanson,* Banff, Tunnel Mt., June 8, 1898 (DAO).

COLOMBIE-BRITANNIQUE: *A. J. Hill,* Thompson River (DAO type); *J. Bostock,* Summerland, dry open woods, May, 1925 (DAO).

RANUNCULUS ACRIS L. var. STEVENII (Andrz.) Lange. De cette variété, Lyman Benson écrit dans l'Am. Midl. Nat. **40**: 37. 1948: "A form with less-dissected leaves . . . occurs in the Craigmyle District, Alberta, and here and there from Quebec to Newfoundland, Nova Scotia, New York, and New England. According to the viewpoint of the writer, this solitary character, associated with nothing else in particular, is not adequate to warrant recognition of a variety."

Il me semble que cette variété mérite d'être maintenue parce que dans son pays d'origine (France et sud-est de l'Europe) cette plante possède une distribution individualisée. Sans doute, les caractères qui séparent var. *acris* et var. *Stevenii* ne sont pas toujours constants, mais les spécimens sous la main possèdent le plus souvent un rhizome horizontal à radicelles épaissies, des feuilles velues à lobes obovés ou rhomboïdes, etc. De plus le var. *Stevenii* (Andrz.) Lange semble avoir une saison de floraison assez distincte. Le matériel canadien sous la main est distribué comme suit: var. *acris,* Terre-Neuve, Nouvelle-Ecosse, Québec, Ontario, Saskatchewan, Alberta, Colombie-Britannique; var. *Stevenii* (Andrz.) Lange, Québec, Ontario, Alberta, Colombie-Britannique. Les spécimens caractéristiques, c'est-à-dire avec des feuilles basilaires et en fleur, sont datés comme suit:

Var. *acris*	Var. *Stevenii*
mai —	
11	
21	
23	

	28		
	29		
	29	mai	29
juin	1		
	4		
	4		
	5		
	6		
	6		
	8		
	8		
	11		
	16		
	17		
	17		
	17		
	21		
	21		
	22		
	24		
	24		
	25		
	25		
	27		
	28		
juillet	1		
	1		
	5		
	8		
	9		
		juillet	10
	11		
	12		
	18		
	18		
	23		
	25		
			29
		août	1
			5
août	6		
			14
	15		
			25
		septembre	8
septembre	11		
			12
			12
			16
			18
			18
	22		

Il faut ajouter que la plupart des spécimens du var. *acris* en fleur après le mi-juillet étaient actuellement des spécimens en fruit portant une ou plusieurs fleurs sur des branches inférieures. Il semble donc que var. *Stevenii* est une entité physiologiquement distincte du var. *acris*, et cela en plus de ses caractères morphologiques et de sa distribution géographique distincte en son pays d'origine.

RANUNCULUS ACRIS L. var. STEVENII (Andrz.) Lange f. **multiplicipetalus** f.n., flore pleno. Typus: *L. Grant 658,* Experimental Station, Kentville, Nova Scotia, June 14, 1938 (DAO). Paratypus: *N. F. Stroud,* roadside, Terrebonne Road, Nova Scotia, June 9, 1935 (DAO).

Echappé de culture en Nouvelle-Ecosse.

RANUNCULUS ACRIS L. var. ACRIS f. **plenus** f.n. flore pleno. Typus: *J. M. Gillett 07-160-7* cultivated at the Dominion Arboretum and Botanic Garden, Ottawa, Ontario. June 29, 1939 (DAO).

La forme à fleurs doubles de cette espèce se rencontre à l'état cultivé tant sous le var. *acris* que sous le var. *Stevenii,* mais seule la première de ces deux formes semble vouloir se naturaliser au Canada.

RANUNCULUS **Buddii** sp. n., sectionis *Epirotis* (Prantl) Benson et affinis *Ranunculo rhomboideo* Goldie et *R. glaberrimo* Hooker. Planta omino glabra (nisi carpellis). Caulis solitarius 7-12 cm. Folia basilaria pauca, integra, ab ellipticis lanceolata, saepius spathulata, (1.5)-2.0-2.5-(3.5) cm long. et (0.5)-0.8-1.0-(1.3) cm lat. Folia caulinaria integra vel trifida vel pedatifida. Flos terminalis et solitarius vel interdum flores 2-3 in planta. Petala elliptica, 6-8 mm long., paulum longiora sepalis. Carpella nonnunquam purpureo tincta, numerosissima, 100-250 in flore. Achenia 1.5-2.0 mm long, puberulentia, rostro 0.3-0.5 mm. Floret aprili et maio.

SASKATCHEWAN: *A. C. Budd,* Swift Current, moist prairie, May 8, 1936 (DAO type); *E. W. Tisdale,* Cadillac Res. Area, coulee, May 12, 1942 (SWC); *J. L. Bolton,* Swift Current, shallow coulee, May 5, 1937 (SWC); *W. Shevkenek,* Bienfait, prairies, June 4, 1947 (DAO); *A. C. Budd,* Consul, low areas on bench land, April 29, 1947 (DAO).

RANUNCULUS BUDDII Boivin f. **monochlamydeus** f.n. apetalus vel petalis 1-2 in flore.

SASKATCHEWAN: *A. C. Budd,* Consul, low areas on bench land, April 29, 1947 (DAO type).

RANUNCULUS **Codyanus** sp. n. Subgeneris *Batrachii* (DC.) Gray. Affinis *Ranunculo*

longirostri Godron. Caulis brevis glaber, vel rarius puberulens, ca 1 mm dia., internodis 1.0-2.5 cm. Folia pubescentia 5-8 mm long., sessilia in apice dilatationis stipularis pubescentis 3-4 mm long. Divisio princeps foliorum ternata, divisio altera dichotoma vel rarius ternata, divisio tertia et ultima etiam dichotoma. Laciniae (9)-12-(14) in folio. Pedunculus 2-3 cm. Sepala ovata ca 3 mm long. Receptaculum pilosum. Stamina a carpellis recedentia vel aequantia, 1.5-2.0 mm. Antherae aurantiacae. Carpella (10)-15-(20) in flore, stylo 0.3-0.5 mm plus minusve marcescens, in fructu 0.2-0.5 mm long. Achenia rugulosa, obovoidea, in apice barbata, 1.2-1.5 mm long.

T-N.-O., KEEWATIN; *W. J. Cody 1712,* Southampton Island, Coral Harbour, South Bay, near beach, in muck around drying up pool and in water, 3 inches high, rooted in muck, very common in one pool only, Aug. 1, 1948 (DAO typus et isotypus, isotypi 8 distribuendi); *W. J. Cody 1518,* eodem, July 24, 1948 (DAO).

Cette nouvelle espèce ressemble superficiellement à un petit *Ranunculus longirostris* Godron. Elle diffère de toutes les autres espèces nord-américaines du sous-genre *Batrachium* (DC.) Gray par ses feuilles pubescentes, à segments peu nombreux, ses étamines courtes ne dépassant pas les styles, ses anthères orangées et ses dimensions réduites.

RANUNCULUS FLABELLARIS Raf. f. FLABELLARIS. *Ranunculus flabellaris* Raf. in Big., Am. Mo. Mag. **3**: 344. 1818 sensu stricto; *Ranunculus delphinifolius* Torrey. Pour le reste de la synonymie, voir Bull. Torr. Bot. Club **69**: 315-6. 1942. Distribution canadienne: du Québec à la Colombie-Canadienne. Deux autres formes pourront se rencontrer:

RANUNCULUS FLABELLARIS Raf. f. **plenus** f.n. differt petalis numerosioribus et staminibus saepius paucioribus. Typus: *I. K. McMorine,* Tennessee, Harriman, April 8, 1898 (DAO).

N'ai vu que le type, mais cette forme se rencontrera sans doute ici et là dans toute l'aire de l'espèce.

RANUNCULUS FLABELLARIS Raf. f. RIPARIUS Fernald. Forme exondée se rencontrant occasionnellement dans l'aire de l'espèce.

RANUNCULUS INAMOENUS Greene var. **elatior** var. n. differt statura majore et cauli debiliore, 3.5-6.5 dm alt.

SASKATCHEWAN, MAPLE CREEK DISTRICT, CYPRESS HILLS PARK: *A. J. Breitung 4406,* in a ravine, July 7, 1947 (DAO type, SASKU, SWC isotypes); *A. J. Breitung 5080,* east slope of Grayburn Butte, shaded place, elev. 4300 ft., July 26, 1947 (DAO); *J. L. Bolton 106,* lake shore, June 25, 1936 (SASKP); *R. C. Russell,* lake shore, June 25, 1936 (SASKU).

Cette variété se distingue du type par sa plus grande taille et ses tiges plus faibles, et aussi par la fixité relative de ses caractères. Alors que le type est une plante très variable par sa taille, 1.0-3.5 dm, la dimension de ses feuilles et de ses pétales, le nombre des achaines, etc., le var. *elatior* varie très peu; ses feuilles sont plutôt grandes et les basilaires sont longuement pétiolées, les pétales sont oblongs, longs de 2-3 mm, larges de 1.0-1.5 mm, les achaines sont au nombre d'environ 40.

RANUNCULUS PEDATIFIDUS Sm. var. CARDIOPHYLLUS (Hooker) Britton f. **apetalus** (Farr) stat. n., *Ranunculus apetalus* Farr, Ott. Nat. **20**: 110-1. 1906.

Forme dépourvue de pétales qui a été trouvée jusqu'ici en Alberta, en Saskatchewan et au Colorado.

II—Caryophyllaceae

ARENARIA RUBELLA (Wahl.) Sm. f. **plena** Calder f.n. floribus plenis, proliferis etiam.

T.-N.-O., FRANKLIN: *Senn & Calder 3739,* Baffin Island, Frobisher Bay, 63° 45'N, 68° 32'W, in dry sandy ground on ridge behind camp, caespitose, all flowers many-petalled, white, stem and leaves with pale colourless glands, July 3, 1948 (DAO type).

CERASTIUM ARVENSE L. Depuis la Nouvelle-Ecosse jusqu'en Colombie-Britannique cette plante se présente sous une phase à sépales à centre vert et à marge hyaline, longs de (4)-5 mm. Sur la côte du Pacifique et dans l'île Vancouver, cette plante passe à la variété suivante:

CERASTIUM ARVENSE L. var. **purpurascens** var. n. sepalis (4)-5-6 mm long et in margine hyalino plus minusve purpureo tincta. Ceterum sicut var. typica. Floret ab aprili in julium.

COLOMBIE-BRITANNIQUE: *J. W. Tolmie,* Victoria, 1897 (DAO type); *H. Groh,* Victoria, Mt. Tolmie, Sept. 24, 1931 (DAO); *J. R. Anderson,* Oak Bay, April 30, 1899 (DAO); *H. Groh,* Comox, Oct. 3, 1930 (DAO);

Macoun, Telegraph Trail, Lat. 54, June 14, 1875 (DAO); *H. Groh 303,* McLeod Lake Distr., near Kamloops, alt. 3500', July 24, 1939 (DAO, intermédiaire); *E. W. Tisdale,* Lytton, April 27, 1938 (DAO); *W. Newton,* Southern Vancouver Island, Sooke Watershed Area, Aug. 10-30, 1940 (DAO); *W. Newton,* Vancouver Island, Telegraph Bay, June 8, 1939 (DAO).

CERASTIUM NUTANS Raf. La phase orientale—et probablement typique—de cette espèce est rarement multicaule et de taille plus petite (8-25 cm), à feuilles caulinaires longues de 1.0-3.5 cm, à sépales longs de 3.0-4.5 mm, à pétales—lorsque présents—environ 1½ fois aussi longs que les sépales, à capsule presque 3 fois aussi longue (8-12 mm) que le calyce. Vers l'ouest cette plante passe graduellement à une plante plus grande, mesurant rarement moins de 25 cm de hauteur sauf dans les spécimens en fleur, et qui diffère également par d'autres caractères et qu'on pourra désigner comme suit:

CERASTIUM NUTANS Raf. var. **occidentale** var. n. 1.5-5.0 dm. alt., frequentius multicaulis foliis 2-5 cm long., 5-10 mm lat. Sepala (4.0)-4.5-5.0 mm. Petala nonunquam desunt saepius breviora, interdum vix longiora quam sepala vel fere ejusdem longitudinis. Capsula 10-13 mm, paullum quam bis longiora quam sepala.

ONTARIO: *H. Groh,* Rainy River, Oct. 18, 1929 (DAO).

MANITOBA: *M. C. Dudley 90,* Indian Bay, June 7, 1941 (DAO); *G. Batho,* Swan River, Nov. 1, 1938 (DAO); *W. N. Denike 38,* North Kildonan, railroad, June 1, 1940 (DAO).

SASKATCHEWAN: *L. T. Carmichael 96,* Regina, June 1, 1944 (DAO); *H. Groh 1169,* Big River, muskeg trail, Sept. 30, 1939 (DAO); *T. Rowles S2753,* Shellbrook, wet places in open woods, July 1, 1947 (DAO); *W. P. Fraser,* Langham, moist place in river valley, June 12 and 26, 1938 (DAO); *A. J. Breitung 560,* Wallwort, at camping ground along Stoney Lake, under aspens, June 15, 1940 (DAO); *A. J. Breitung 655,* 5 mi. W. of Wallwort, in moist woodland trail, July 15, 1940 (DAO type).

ALBERTA: *H. Groh,* Peace River, Sept. 12, 1934 (DAO); *G. H. Turner 6,* Fort Saskatchewan, dry shaded ground, June 5, 1938 (DAO); *G. H. Turner 2877,* 6 miles n.e. of Fort Saskatchewan, low place in poplar woods, June 4, 1942 (DAO); *G. H. Turner 4440,* 2 miles west of Fort Saskatchewan, at edge of small pond in poplar woods, June 26, 1945 (DAO); *G. H. Turner 4051,* 2 mi. w. of Fort Saskatchewan, shore of tiny lake, June 16, 1944 (DAO); *H. Groh,* Barrhead, June 27, 1935 (DAO); *A. E. Wigmore,* Blackfolds, June 1939 (DAO); *H. Groh 1074,* Peace River District, Heart River, near Grouard, ditch, Sept. 19, 1939 (DAO).

COLOMBIE-BRITANNIQUE: *H. Groh,* Dawson Creek, Sept. 3, 1934 (DAO).

LYCHNIS APETALA L. var. APETALA, *Lychnis apetala* L., Sp. pl. 1: 437. 1753, sensu stricto.

Pétales inclus émarginés au sommet. Fleurs penchées ou dressées. Calyce vert pâle à nervures pourpres. Fruit le plus souvent dressé. Plante scandinave à distribution très restreinte. Depuis le Spitzbergen jusque dans les Rocheuses de l'Alberta on rencontre le var. *glabra* Regel (= *Melandrium apetalum* ssp. *arcticum* (Fries) Hultén) qui, bien que normalement pubescent, diffère néanmoins par ses fleurs toujours penchées à pétales nettement exserts. Plus à l'est on rencontrera encore:

LYCHNIS APETALA L. var. **nutans** var. n. Floribus nutantibus. Calyx violaceo tinctus nervis atro-purpureis, pubescentia nigra. Petala inclusa lobis oblongis. Fructus saepius nutans.

DISTRICT DE FRANKLIN, TERRE DE BAFFIN: *J. A. Calder 2012,* Frobisher Bay, sandy beach near stream, July 14, 1948 (DAO); *Senn & Calder 3868,* Frobisher Bay, along stream course, 1½ miles north of station, July 10, 1948 (DAO); *Senn & Calder 3746,* Frobisher Bay, on dry heath below ridge ¼ mile N. of camp, July 5, 1948 (DAO); *H. A. Senn 3532,* Frobisher Bay, moist mossy plain, June 24, 1948 (DAO); *H. A. Senn 3615,* Frobisher Bay, moist sand above beach, June 28, 1948 (DAO); *H. A. Senn 3637,* Frobisher Bay, hummocks in *Carex—Sphagnum* meadow, June 21, 1948 (DAO).

DISTRICT DE FRANKLIN, PENINSULE DE MELVILLE: *W. J. Cody 1458,* Ross Bay, moist shallow soil on igneous bouldered hillside, July 21, 1948 (DAO).

DISTRICT DE KEEWATIN, ILE SOUTHAMPTON: *W. J. Cody 1341,* Coral Harbour, roadside near landing on South Bay, moist gravel, July 16, 1948 (DAO type); *W. J. Cody 1205,* Coral Harbour, south of camp area, moist sandy gravel of dried up creek, July 7,

1948 (DAO); *W. J. Cody 1209,* Coral Harbour, north end of new airstrip, moist sandy gravel, July 9, 1948 (DAO); *W. J. Cody 1824,* Coral Harbour, E. of camp area, edge of *Carex* meadow over gravel, Aug. 4, 1948 (DAO); *W. J. Cody 1099,* landing at South Bay, rich moist soil over gravel, July 2, 1948 (DAO); *W. J. Cody 1224,* Coral Harbour, upper beach W. of landing, moist sandy soil over gravel, July 9, 1948 (DAO).

LYCHNIS APETALA L. var. NUTANS Boivin f. **palea** (Polunin) stat. n., *Lychnis apetala* L. f. *palea* Polunin, Contr. Gray Herb. 165: 97. 1947.

LYCHNIS **Gillettii** sp. n. Planta perennis, viscosa, dense pubescens, multicaulis. Caules omnes stricti et multo variant altitudine; elatiores (1.8)-2.5-(3.5) dm alt., minores fere decimetri. Folia basiliara et caulinaria anguste linearia, apice acuta, 2.5-7.0 cm long., 2-7 mm lat. Folia inflorescentiae, et pariter bracteae, consimilia sed minora. Pedunculi erecti (1)-2-(6) cm long. Flores erecti numero variabiles, saepius 3, nonnunquam 1-5 in cauli. Calyx pene inflatus, fere oblongus, 10-13 mm long., nervis conspicue purpureis. Petala alba paullum exserta. Fructus erectus fere exsertus. Semen brunneum, semi-orbiculare vel reniforme, minute rugulosum, alato-inflatum, (1.0)-1.2-(1.5) mm lat.

MANITOBA: *J. M. Gillett 2418,* Fort Churchill, along E-W runway, gravel and peat, Aug. 5, 1948 (DAO. type et isotype); *J. M. Gillett 1917,* Fort Churchill, gravel, fl. white, June 30, 1948 (DAO); *J. M. Gillett 2099,* Ft. Churchill, near Junction, gravel area, erect clumps, sticky calyx, localized, fairly abundant, July 15, 1948 (DAO); *E. Beckett 3794,* Churchill dry stony ground, July 10, 1946 (DAO).

LYCHNIS **Ostenfeldii** (Porsild) stat. n., *Melandrium Ostenfeldii* Porsild, Sargentia 4: 37. 1943.

LYCHNIS TRIFLORA Br. ex Somm., Mag. Naturvid. 2: 152-3. 1824; *Lychnis affinis* Vahl. ex Fries, Mantissa 3: 36. 1842.

Le *Lychnis triflora* Br. ex Ross, Voy. Disc. 2: 192. 1819 est un nomen nudum et il faut attendre jusqu'en 1824 pour trouver une description valide du *Lychnis triflora* Br. En lisant la description de Sommerfeld et les notes de M. P. Porsild dans Sargentia 4: 34. 1943, il appert que cette plante est identique avec le *Lychnis affinis* Vahl publié 18 ans plus tard. Voir *Silene furcata* Raf. pour le problème de l'application du *Lychnis furcata* (Raf.) Fernald. Ce qui passe couramment sous le nom de *Lychnis triflora* ou *Melandrium triflorum* est une toute autre plante qui, bien que connue depuis plus d'un siècle, ne semble pas avoir encore été baptisée correctement. Je propose donc de l'appeler:

LYCHNIS **Sorensenis** sp. n. Planta perennis, viscosa, dense glandulosa, multicaulis. Caules stricti, 0.5-3.0 dm alt., parum variant altitudine in eadem planta. Folia basilaria oblanceolata vel lineari-oblanceolata, 1-3-(5) cm long., 2-10 mm lat., apice acuta. Folia caulinaria nonnumquam desunt, saepius tamen bina, sessilia, plus minusve lanceolata, 0.4-4.0 cm long., 2-8 mm lat., apice acuta. Folia inflorescentiae, et pariter bracteae, consimilia sed minora. Flores 1-3 erecti, laterales sessiles vel pedunculo 0.1-1.0-(2.0) cm. Calyx pene inflatus, ellipsoideus vel suburceolatus, 9-11 mm long., densissime glanduloso-pilosus e pilis monilibus 0.5-2.0 mm, nervis conspicue purpureis. Petala alba conspicue exserta. Fructus erectus paullum apice exsertus. Semen brunneum, deltoideum vel reniforme, 1 mm lat., minute rugosum, nec alato-inflatum, sed angustissime marginatum margine denticulato 0.1 mm lat.

GRØNLAND: *T. Sørensen 4446.* Home Foreland, Red River, basalt ridge, lat. 73° 53' long. 21° 00', alt. 50-75 m., 26 July 1933 (DAO); *T. Sørensen 2352,* Skaerfjord, Cape Amelie, lat. 77° 32', long. 19° 20', 12 Aug., 1933 (DAO); *T. Sørensen 4445,* Clavering Island, Granatdal, lat. 74° 10', long. 21° 34', alt. abt. 500 m., 20 July, 1933 (DAO); *T. Sørensen 386,* The northernmost Fame Isl., bird cliff, lat. 70° 50', long. 22° 30', alt. 10-30 m., 8 July, 1933 (DAO); *T. Sørensen 4439,* Clavering Island, Hird Bay, dry bird-hill, lat. 74° 10', long. 20° 30', alt. abt. 50 m., 23 July, 1933 (DAO); *T. Sørensen 2319 & 2321,* Skaerfjord, C. F. Mourier Fjord, near the sea-shore, lat. 77° 25', long. 20° 15', 15 Aug., 1933 (DAO); *T. Sørensen 359a,* Liverpool Land, east side of Hurry Inlet, Kalkdal, naked clayey ground at the sea-shore, lat. 70° 50', long. 22° 20', alt. 5-10 m., 10 July, 1933 (DAO type); *T. Sørensen 4470, 4482 & 4485,* Clavering Island, Eskimonaes, lat. 74° 06', long. 21° 20', alt. 0-40 m., 16 July, 1933 (DAO); *T. Sørensen 2307,* Germania Land, Danmarkshavn, at the old Expedition-house, lat. 76° 46', long. 18° 46', alt. 0-10 m., 10 Aug., 1933 (DAO); *T. Sørensen 2337 & 2338,* Skaerfjord, north side of Klaegbugt, lat. 77° 40', long.

20° 54', alt. 25-50 m., 13 Aug., 1933 (DAO); *T. Sørensen 4428 & 4437,* Gael Hamke Bay, Terneskaer I., lat. 73° 55', long. 21° 00', 26 July, 1933 (DAO); *T. Sørensen 4453, 4457 & 4463,* Clavering Island, Granatelv, lat. 74° 10', long. 21° 34', alt. 30-40 m., 18-19 July, 1933 (DAO); *T. Sørensen 390, 394, 395 & 396,* Liverpool Land, east side of Hurry Inlet, Kalkdal, lat. 70° 50', long. 20° 20', alt. 0-50 m., 10 July-9 Aug., 1933 (DAO).

La pubescence du calyce est beaucoup plus courte chez le *L. triflora* Br. (= *L. affinis* Vahl) et permet de distinguer facilement ces deux espèces à tous les stages de leur développement.

SILENE FURCATA Raf., Aut. Bot. 28. 1840; *Lychnis furcata* (Raf.) Fernald, Rhodora 34: 22. 1932; *Viscago furcata* Raf. ut syn. ex Porsild, Sargentia 4: 33. 1943; *Melandrium furcatum* (Raf.) Hultén, Fl. Alaska & Yukon 4: 702. 1943; *Melandrium furcatum* (Raf.) Hylander, Upp. Un. Arsskrift 7: 162. 1945.

Il n'existe pas que je sache de type du *Silene furcata* Raf. Sans doute s'il existait un spécimen type le problème de l'application exacte de ce nom pourrait probablement être résolu de façon satisfaisante, mais en l'absence de type, nous sommes forcés de nous en tenir strictement à la description originale de Rafinesque qui se lit en partie comme suit:

"SILENE (Viscago) *furcata* Raf. . . . . Labrador and Hudson Bay . . . . a real Silene not dioical and with 3 styles . . . ."

Après avoir examiné des centaines d'individus de *Lychnis apetala, alpina, triflora* et *Gillettii* provenant de la région de la baie d'Hudson et du Labrador, je puis affirmer que je n'ai vu que des fleurs à 5 styles. On ne peut donc appliquer la description de Rafinesque à aucun des *Lychnis* qui se rencontrent dans la région du type du *Silene furcata.* Par conséquent je me vois forcé de considérer ce nom comme un *nomen dubium* qui, à tout hasard, ne peut s'appliquer au genre *Lychnis.*

STELLARIA CALYCANTHA (Led.) Bongard. Le status des variétés de cette espèce est fort confus. En particulier les clefs de E. Hultén dans son Fl. Alaska, Yukon, 4: 646-7, 1944 et celles de M. L. Fernald dans Rhodora 16: 150, 1914 se contredisent sur plusieurs points surtout en ce qui a trait au var. *sitchana* et au var. *Bongardiana.* Et ce que Hultén cite sous le nom *Stellaria longifolia* Muhl. me semble bien être le *S. calycantha* var. *floribunda* Fernald et non pas la plante de Muhlenberg.

STELLARIA CALYCANTHA (Led.) Bongard var. **latifolia** var. n., glabra, debilis, 2-4 dm alt., foliis primariis tenuis elliptico-lanceolatis, 2.0-3.5 cm long., 0.7-1.0 cm lat., foliis inflorescentiae dimidio brevioribus quam primariis floribus paucis, sepalis (1.8)-2.0-(2.5) mm long.

ALBERTA: *G. H. Turner 4590,* Spruce woods ⅛ mile north of Davis' Lake, 5 miles southeast of Fort Saskatchewan, July 24, 1948 (DAO type); *G. H. Turner 5178,* moraine above highway terminus at Mt. Edith Cavell, Jasper National Park, Aug. 17, 1946 (DAO); *G. H. Turner,* Fort Saskatchewan, wet places in woods, May 31, 1938 (DAO); *G. H. Turner 1731,* 6 miles N.E. of Fort Saskatchewan, wet springy place in poplar woods, June 6, 1940 (DAO); *G. H. Turner 3076,* 5 miles S.E. of Fort Saskatchewan, ¼ mi. S. of Davis Lake, in spruce woods, July 13, 1942 (DAO).

COLOMBIE-BRITANNIQUE: *H. Groh 267,* Kamloops Range Experimental Station, Pass Lake, low meadow in montane forest, July 22, 1939 (DAO).

Reconnaissable par ses feuilles caulinaires plutôt grandes et larges, ses feuilles de l'inflorescence pas très réduites, ses fleurs peu nombreuses à sépales très courts. Toute la plante est glabre sauf parfois quelques feuilles légèrement ciliées à la base.

STELLARIA MONANTHA Hultén var. MONANTHA, *Stellaria monantha* Hultén sensu stricto, Bot. Not. 265-6. 1943.

STELLARIA MONANTHA Hultén var. **atlantica** (Hultén) stat. n., *Stellaria monantha* ssp. *atlantica* Hultén, Bot. Not. 267-8. 1943.

III—Compositae

LES VARIATIONS CANADIENNES DE L'ACHILLEA MILLEFOLIUM L.

Rydberg dans le North Am. Fl. 34: 219-227. 1916 reconnaît pour le Canada 14 espèces d'*Achillea* dont 11 appartiennent au complexe de l'*Achillea Millefolium.* L'étude de l'abondant matériel sous la main (quelque 200 feuilles d'herbier) me permet de conclure que ces 11 entités, ou du moins celles qui sont représentées parmi les spécimens à ma disposition, ne sont pas spécifiquement distinctes entre elles parce qu'aucun des caractères qui les séparent n'est suffisamment constant, et parce qu'on n'y rencontre aucun groupe de deux ou plusieurs caractères cons-

tamment associés. Cependant l'*Achillea Millefolium* tel qu'on le rencontre au Canada se laisse diviser en une série de variétés qui, bien que séparées par des différences pas toujours constantes et d'ordre mineur, n'en présentent pas moins chacune un faciès particulier et une distribution géographique individualisée. Et ces entités, forment 3 groupes assez nets que j'appellerai sous-espèces et qu'on pourra différencier comme suit:

1. Plante naturalisée à inflorescence aplatie, à feuilles rapprochées, les inférieures larges le plus souvent de 2-3 cm, à lobes étalés. Tégules à marge de couleur variable, le plus souvent brune, parfois noirâtre, occasionnellement hyaline. Ligules plutôt petites, blanches, roses, ou pourpres ..... ssp. *Millefolium*

2. Plante indigène à corymbe convexe, à feuilles plus espacées, plus étroites, les inférieures ne dépassant pas 1.5 cm de largeur, à lobes plus ou moins incurvés ce qui donne à la feuille une apparence plutôt touffue. Tégules à marge de couleur pâle ou hyaline. Ligules petites, blanches ..... ssp. *pallidotegula*

3. Plante indigène à corymbe convexe, à feuilles assez étroites, les inférieures larges de 1-2 cm, à lobes plus ou moins incurvés. Tégules à marge de couleur foncée, parfois presque noire. Ligules grandes ou petites, blanches ou rarement rosées ..... ssp. *atrotegula*

A leur tour ces sous-espèces se subdivisent en variétés et formes. On peut dire, d'une façon générale, que notre connaissance de la flore de l'Amérique du Nord n'est pas encore assez approfondie pour qu'on puisse habituellement distinguer entre sous-espèces et variétés. Etant donné la priorité bien évidente de la catégorie "variété" j'ai jusqu'ici employé ce terme du manière exclusive pour désigner toute entité inférieure à l'espèce mais possédant une distribution géographique distincte. Dans le cas de l'*Achillea Millefolium*, le matériel abondant et les variations nombreuses et complexes nous permettent déjà de reconnaître deux catégories bien différentes de subdivisions; les unes majeures, ou "sous-espèces", comprenant chacune une ou plusieurs subdivisions mineures ou "variétés". Tant les variétés que les sous-espèces possèdent une distribution géographique individualisée. Voir à ce sujet: M. L. Fernald, Rhodora **42**: 239-246, 1940; R. T. Clausen, Rhodora **43**: 157-167, 1941; F. R. Fosberg, Rhodora **44**: 154-7, 1942; C. A. Weatherby, Rhodora **44**: 157-167, 1942. Sans doute à mesure que notre connaissance de la flore canadienne s'approfondira, il deviendra de plus en plus nécessaire de coordonner sous-espèces et variétés à l'intérieur de chacune de nos espèces les plus variables. Le matériel que j'ai sous la main ne contient pas apparemment de spécimens représentant toutes les variations que reconnaît Rydberg pour le Canada, mais la clé qui suit, bien que basée uniquement sur les spécimens de l'herbier de la Division de Botanique et Phytopathologie, ne sera sans doute pas sans quelque utilité.

Clausen, Keck & Hiesey (Carn. Int. Wash. **520**: 296-324. 194) et W. E. Lawrence (Am. J. Bot. **34**: 538-545. 1947) travaillant sur du matériel différent du mien et provenant de régions généralement différentes ont trouvé que certaines variations du groupe de *A. lanulosa* Nuttall étaient toutes tétroploïdes (n = 18) alors que les variations affines de l'*A. borealis* Bongard étaient toutes hexaploïdes (n = 27). Quant à l'*A. Millefolium* introduit, il semble varier quelque peu étant tantôt pentaploïde (2n = 43-46) tantôt hexaploïde (n = 27, 2n = 54).

Ces études cytologiques s'accordent assez bien avec la division proposée ici en 3 sous-espèces dont la première, ssp. *Millefolium*, serait tantôt pentaploïde, tantôt hexaploïde; la seconde, ssp. *pallidotegula*, serait tétraploïde; la troisième, ssp. *atrotegula*, serait hexaploïde.

1—ACHILLEA MILLEFOLIUM L. ssp. MILLEFOLIUM var. MILLEFOLIUM f. MILLEFOLIUM. Plante haute de 2.5-7.0 dm. Feuilles variables, les supérieures environ 0.7 cm de largeur, les inférieures étroitement oblancéolées, généralement larges de 2-3 cm, à lobes étalés. Tige et feuilles pubérulentes, à pubescence d'un blanc pur; inflorescence pubérulente à pubescence d'un blanc pur ou plus fréquemment jaunâtre. Tégules à marge brune ou parfois brun pâle ou jaunâtre, ou même transparente, occasionnellement brun foncé à noirâtre. Ligules blanches, longues de (1.0)-1.5-2.2-(2.5) mm. Naturalisé au Canada depuis l'île de Sable (Nouvelle-Ecosse) jusqu'en Ontario. Aussi plus au nord à la Terre-Neuve et au Groenland (vide M. P. Por-

a. Tige et feuilles caulinaires à pubescence d'un blanc pur, inflorescence à pubescence blanche, ou jaunâtre, ou rousse.
  b. Ligules roses ou pourpres.
    c. Ligules rosées supérieurement.
      d. Corymbe généralement aplati, feuilles inférieures larges de 2-3 cm, à lobes étalés ..... 2. f. *rosea*
      dd. Corymbe convexe, feuilles inférieures larges de 2 cm ou moins, à lobes plus ou moins incurvés ..... 10. f. *discolor*
    cc. Ligules pourpres supérieurement, roses inférieurement ..... 3. f. *purpurea*
  bb. Ligules blanches.
    e. Tégules à marge hyaline ou jaunâtre ou brun pâle. Ligules petites.
      f. Corymbe généralement aplati, feuilles inférieures larges de 2-3 cm, à lobes étalés ..... 1. f. *Millefolium*
      ff. Corymbe convexe, feuilles larges de 1.5 cm ou moins, à lobes fortement incurvés.
        g. Plantes hautes de 2-4 dm, pubescence d'un blanc pur, tégules à marge le plus souvent hyaline.
          h. Tégules ne dépassant pas 2.5 mm de longueur et de largeur ..... 4. var. *pallidotegula*
          hh. Tégules plus larges que longues, larges de 3.0-3.5 mm ..... 5. var. *megacephala*
        gg. Plantes hautes de 4-7 cm, pubescence de la tige et des feuilles caulinaires d'un blanc pur, pubescence de l'inflorescence plus ou moins jaunâtre, tégules à marge le plus souvent brun pâle ..... 6. var. *russeolata*
    ee. Tégules à marge brun foncé ou noirâtre, ligules petites ou grandes.
      i. Ligules grandes, longues de (2.5)-3.0-3.5-(4.0) ..... 7. var. *atrotegula*
      ii. Ligules petites, longues de (1.0)-1.5-2.2-(2.5).
        j. Corymbe généralement aplati, feuilles inférieures larges de 2-3 cm, à lobes étalés ..... 1. f. *Millefolium*
        jj. Corymbe convexe, feuilles inférieures larges de 2 cm ou moins, à lobes plus ou moins incurvés.
          k. Plante haute de 4-7 dm ..... 8. var. *parviligula*
          kk. Plante haute de 1-4 dm ..... 9. var. *parvula*
aa. Tige et feuilles caulinaires à pubescence abondante et rousse.
  l. Ligules blanches ..... 11. var. *fulva*
  ll. Ligules plus ou moins rosées ..... 12. f. *roseiflora*

sild. Medd. Gr. 134, 4: 36-9, 1946). La forme typique à ligules blanches, f. *Millefolium*, est la plus commune, mais on rencontrera aussi fréquemment les deux formes qui suivent:

2—ACHILLEA MILLEFOLIUM L. ssp. MILLEFOLIUM var. MILLEFOLIUM f. ROSEA Rand & Redfield. Ligules rosées. Occasionnel avec la forme typique. De cette forme il existe aussi une récolte provenant des Monts Cyprès en Saskatchewan.

3—ACHILLEA MILLEFOLIUM L. ssp. MILLEFOLIUM var. MILLEFOLIUM f. PURPUREA (Gouan) Schinz & Thellung. Ligules pourpres supérieurement, rosées inférieurement. Occasionnel avec la forme typique.

ACHILLEA MILLEFOLIUM L. ssp. **pallidotegula** ssp. n. Foliis angustis, inferioribus 5-15 mm lat., lobis incurvatis plus minusve confertis. Tegulis margine pallidis vel hyalinis. Ligulis parvis, (1.0)-1.5-2.2-(2.5) mm albis. Inflorescentia corymbosa convexa.

4—ACHILLEA MILLEFOLIUM L. ssp. PALLIDOTEGULA Boivin var. PALLIDOTEGULA, *Achillea lanulosa* Nuttall, Journ. Ac. Phil. 7: 36. 1834.

MANITOBA: *H. Groh,* Rosser, July 20, 1922 (DAO); *H. Groh,* Meadows, June 8, 1932 (DAO); *M. C. Abey,* Chater, July 19, 1937 (DAO).

SASKATCHEWAN: *W. Shevkenek,* Outram, roadside, June 16, 1947 (DAO); *A. J. Breitung 5340,* Cypress Hills, dry prairie near Fort Walsh, common, Aug. 2, 1947 (DAO); *A. J. Breitung 5161,* Cypress Hills, Fort, Common, July 29, 1947 (DAO); *A. J. Breitung 4328,* Cypress Hills Park, dry prairie, July 3, 1947 (DAO); *R. C. & L. M. Russell S2728,* Touchwood Hills, Product P.O., open prairie near poplar bluff, July 10, 1947 (DAO); *H. A. Senn, E. W. Tisdale, A. C. Budd 2374,* Cypress Hills Park, sub-montane prairie, bench at 4100', common, fls. white, 12" high, July 19, 1946 (DAO); *W. Shevkenek,* Regina, common on prairies, June 25, 1938 (DAO); *W. Shevkenek,* Regina, prairies, June 11, 1939 (DAO); *R. C. Russell & R. J. L.,* Saskatoon, open prairie near bluff, June 19, 1936 (DAO); *H. A. Senn 2472,* 10 miles S. Wood Mountain at 3100', dry hillside, fairly common, fls. white, 6" high, July 23, 1946 (DAO); *R. C. Russell S3726,* Cutknife, rolling prairie near a bluff, July 24, 1927 (DAO); *H. Groh 1158,* Big River, Dry field, Sept. 29, 1939 (DAO).

ALBERTA: *H. Groh,* Jasper, dry hillside, June 29, 1935 (DAO); *E. H. Moss 242,* N. of Pincher, prairie, west facing slope, thin black silt-loam, Aug. 2, 1939 (DAO); *H. Groh 690,* Peace River District, south of Wapiti, white soil of parkland, Aug. 24, 1939 (DAO); *G. H. Turner 2079,* Fort Saskatchewan, dry open prairie, July 28, 1940 (DAO); *M. C. Dudley,* Calgary, June 28, 1940 (DAO); *F. Fyles,* Lethbridge, field, Aug. 7, 1914 (DAO); *A. H. Brinkman 5161,* Craigmyle District, prairie grassland, June 20, 1942 (DAO); *B. O'Connor 17-5,* Lamont, Elk Island National Park, clearing on hill, leafy loam soil, Aug. 22, 1939 (DAO); *E. H. Moss 7496,* Spirit River, grassland, July 24, 1947 (DAO); *H. Groh 662a,* Peace River District, Beaverlodge, railway yards, Aug. 23, 1939 (DAO).

5—ACHILLEA MILLEFOLIUM L. ssp. PALLIDOTEGULA Boivin var. **megacephala** (Raup) stat. n., *Achillea megacephala* Raup, J. Arn. Arb. 17: 306-7, pl. 199. 1936.

Apparemment une variation à grandes ligules plus larges que longues et à capitules généralement plus gros.

ALBERTA: *H. M. Raup 6913,* Lake Athabaska, on large shifting sand dunes west of William Point, Aug. 20, 1935 (G type).

6—ACHILLEA MILLEFOLIUM L. ssp. PALLIDOTEGULA Boivin var. **russeolata** var. n. Planta erecta 4-7 dm. Folia inferiora angusta, (8)-10-15-(18) mm lat. Tegula margine saepius pallide brunneo, interdum hyalino vel brunneo in apice. Pubescentia inflorescentiae plus minusve luteolens vel pallide russeolata. Pubescentia caulis et foliorum niveo-alba.

ONTARIO: *W .N. Denike 340,* Ingolf, edge of woods, July 8, 1939 (DAO); *J. Hutchinson A. 31,* Shuniah Mines, Thunder Bay, July 3, 1938 (DAO).

MANITOBA: *H. Groh,* Meadows, fields, June 8, 1932 (DAO).

SASKATCHEWAN: *H. A. Senn, H. Groh, R. C. Russell 2873,* 2 miles N. Prince Albert, dry pine woods, occasional, Aug. 1, 1946 (DAO); *H. A. Senn, H. Groh, R. C. Russell 2846,* Pilger, moist roadside, Aug. 11, 1946 (DAO); *A. J. Breitung 4626,* Cypress Hills Park, common on the plateau, July 11, 1947 (DAO); *R. C. Russell & R. J. Ledingham,* Pike Lake, roadside ditch, June 6, 1933 (DAO); *A. J. Breitung 1338,* Wallwort, low moist swampy ground, common, July 16, 1941 (DAO); *A. J. Breitung 1754,* Tisdale, semi-open prairie to prairie, common everywhere, Aug. 1, 1943 (DAO type); *J. Laycock,* Sunny Brow (DAO); *J. Laycock,* Bjorkdale (DAO); *H. S. Jones 10,* Eastend, 1942 (DAO).

ALBERTA: *R. H. Dixon 1662,* Macleod District, pasture lands, July 7, 1940 (DAO); *H. Groh,* Edmonton, August 14, 1933 (DAO); *G. H. Turner 1999,* Fort Saskatchewan, edge of poplar woods, July 12, 1940 (DAO); *H. A. Senn 2685,* Athabaska, edge of woods, Aug. 7, 1946 (DAO).

COLOMBIE-BRITANNIQUE: *J. Bostock,* Summerland, roadsides and fields, June 1925 (DAO); *E. W. Tisdale 40-754,* Tranquille Range, Kamloops, open Pinus ponderosa woods, common in grassland, July 1936 (DAO).

ACHILLEA MILLEFOLIUM L. ssp. **atrotegula** ssp. n. Foliis angustis, inferioribus 1-2 cm lat., lobis plus minusve incurvatis. Tegulae margine atro-brunneae vel nigrescentes. Inflorescentia corymbosa convexa. Pubescentia omnis niveo-alba.

7—ACHILLEA MILLEFOLIUM L. ssp. ATROTEGULA Boivin var. ATROTEGULA, *Achillea Millefolium* L. var. *nigrescens* Meyer, Pl. Lab. 65, 1830;? *Achillea borealis* Bongard, Mem. Ac. St. Pet. 6,2: 149. 1832.

ALASKA: *Dutilly, Lepage & O'Neill 21 843,* Anchorage, vicinity of Eagle River, Aug. 2, 1947 (DAO); *W. J. Eyerdam 6128,* Kodiak group, Raspberry Island, Port Vita, on sea cliffs, Aug. 1, 1946 (DAO); *W. J. Eyerdam 5252,* Raspberry Island, Port Vita, near mountain top, Aug. 26, 1946 (DAO).

LABRADOR: *F. McGillivray,* Cartwright, Aug. 17, 1918 (DAO).

QUEBEC: *Dutilly & Lepage 14 523,* Rivière aux Mélèzes, rivage de sable, 9 août 1945 (DAO); *Dutilly & Lepage 14 764,* Fort Chimo, baie d'Ungava, 14 août 1945 (DAO); *J. A. Calder 2231,* Fort Chimo, sand beach near mouth of river, very common, Aug. 1, 1948 (DAO); *J. A. Calder 2447,* Fort Chimo, Hudson Bay Post, meadow area by the "Post", very common, Aug. 7, 1948 (DAO).

ONTARIO: *Dutilly & Lepage 16 413,* Baie James, Attawapiskat, rapide du 40° mille, calcaires siluriens, 16-31 août 1946 (DAO); *Dutilly & Lepage 16 558,* James Bay, Lake River, lieu tourbeux et frais, 1 sept. 1946 (DAO); *Dutilly & Lepage 15 482,* James Bay, Attawapiskat, lieu glaisseux autour du poste, 20 juillet 1948 (DAO).

MANITOBA: *M. G. Dudley 88,* Indian Bay, June 7, 1941 (DAO); *P. Q. MacKinnon 6,* Churchill, in gravel and sandy soil, Aug. 2, 1947 (DAO); *J. M. Gillett 2704,* Gillam (Mile 326, Hudson Bay Railway) clearing near railway and in railway yards, Aug. 22, 1948 (DAO); *J. M. Gillett 2138,* Warkworth Creek near Churchill, railroad gravel ballast and in spruce forest, July 19, 1948 (DAO); *J. M. Gillett 2100,* Ft. Churchill, near Junction, July 15, 1948 (DAO).

ALBERTA: *L. Jenkins 127,* Beaverlodge, open ground, June 27, 1947 (DAO); *L. Jenkins 352,* Beaverlodge, open places, July 27, 1947 (DAO); *H. Groh,* Banff, waste places, Aug. 31, 1930 (DAO); *J. Fletcher 997,* Sulphur Mtn., Banff, July 26, 1901 (DAO).

COLOMBIE-BRITANNIQUE: *E. H. Wallis 35,* Mt. Revelstoke Park, alt. 4700 ft., grassy roadside, Sept. 27, 1939 (DAO); *F. Fyles,* Burgess Pass, Aug. 31, 1914 (DAO); *H. Groh,* Vancouver, North Shore, mtn. above Fisherman's Cove, May 23, 1931 (DAO); *I. Mounce,* Vancouver Island, Saanichton, July 1939 (DAO); *H. Groh,* Esquimalt, May 25, 1931 (DAO); *H. Groh,* Victoria, May 28, 1931 (DAO).

8—ACHILLEA MILLEFOLIUM L. ssp. ATROTEGULA Boivin var. **parviligula** var. n. Planta 4-7 dm. alt., ligulis parvis, quadratis, 1.5-2.5 mm. long., 1.5-2.0 mm lat.

ALASKA: *E. H. & H. B. Loof 193,* Kodiak I., Olga Bay, valleys, July 20, 1938 (DAO); *W. J. Eyerdam 3841,* Kodiak Group, Raspberry Island, Raspberry Strait, Port Vita, in tall grass, July 25, 1945 (DAO type).

9—ACHILLEA MILLEFOLIUM L. ssp. ATROTEGULA Boivin var. **parvula** var. n. minor, 1-4 dm alt., ligulis quadratis albis 1.5-2.5 mm long., 1.5-2.5 mm lat.

QUEBEC: *Victorin, Rolland & Dominique 49 016,* Co. Gaspé, île Bonaventure, sur les conglomérats du rivage, 23 juillet 1936 (DAO); *J. A. Calder 1450,* Témiscouata Co., shoreline at Notre Dame du Portage, growing in pockets in rich soil along rocky ledges, Aug. 11, 1947 (DAO); *Dutilly & Lepage 14 118,* Rupert House, sandy terrace, 7 juillet 1945 (DAO); *Dutilly & Lepage 14 066,* Rupert House, open sandy terrace, 3 juillet 1945 (DAO); *Dutilly & Lepage 14 130,* Rupert House, clayey bank, 10 juillet 1945 (DAO); *Dutilly & Lepage 14 164,* Vieux Comptoir, sandy soil, 14 juillet 1945 (DAO); *Dutilly & Lepage 14 282,* Golfe de Richmond, sandy terrace, 19 juillet 1945 (DAO).

ONTARIO: *Dutilly & Lepage 16 905,* Hudson Bay, Weenusk, 19-20 sept. 1946 (DAO); *Dutilly & Lepage 15 980,* James Bay, Albany, rivage graveleux, 3 août 1946 (DAO).

MANITOBA: *E .Beckett 3739,* Churchill, 15 Aug., 1946 (DAO); *A. H. R. Buller 128,* Churchill, Aug. 13-15, 1939 (DAO); *P. Q. MacKinnon 95,* Churchill, in disturbed areas along roads, occasional, Aug. 24, 1947 (DAO); *J. M. Gillett 2307,* Knife Lake, 120 miles s.w. of Churchill, clearing about trapper's cabin, abundant, July 28, 1948 (DAO); *J. M. Gillett 2038,* Ft. Churchill, sand beach, July 9, 1948 (DAO type, isotype).

10—ACHILLEA MILLEFOLIUM L. ssp. ATROTEGULA Boivin var. PARVULA Boivin f. **discolor** f. n. ligulis superne roseis, inferne albis sive pallide roseis.

ONTARIO: *Dutilly & Lepage 15 957,* Albany, rivage graveleux, 3 août 1946 (DAO type); *Dutilly & Lepage 15 388,* James Bay, Natabiska Pt., terrasse de sable, 12 juillet 1946 (DAO).

11—ACHILLEA MILLEFOLIUM L. ssp. ATROTEGULA Boivin var. **fulva** var. n. dense

lanata, pubescentia omnis fulva. Ligulae 1.5-3.0 mm long.

QUEBEC: *V. R. Wood & L. N. Thompson 4*, Saguenay Co., Harrington Harbour, in ash dump, Aug. 18, 1940 (DAO).

COLOMBIE-BRITANNIQUE: *Anderson & Fletcher 947*, Mt. Arrowsmith, V.I., 5500 ft., top of ridge, 7 August, 1901 (DAO type).

12—ACHILLEA MILLEFOLIUM L. ssp. ATROTEGULA Boivin var. FULVA Boivin f. **roseiflora** f. n. ligulis roseis.

QUEBEC: *V. R. Wood & L. N. Thompson 3*, Saguenay Co., Harrington Harbour, in ash dump, Aug. 18, 1940 (DAO type).

ANTENNARIA PARVIFOLIA Nuttall, Trans. Am. Phil. Soc. n.s. **7**: 406. 1841 pro parte; emend. Greene, Pittonia **3**: 175. May 27, 1897 et **3**: 276-7. 1898; *Antennaria microphylla* Rydberg, Bull. Torr. Bot. Club **24**: 303. June 29, 1897; *Antennaria nitida* Greene, Pittonia **3**: 283. 1898.

D'après la description originale, il semble bien que l'*A. parvifolia* Nuttall est hétérogène. D'après Fernald (ex Cronquist, Rhodora **48**: 120. 1946) l'un des cotypes préservés au British Museum contient du matériel des *A. rosea* Greene, *A. microphylla* Rydberg et *A. aprica* Greene.

D'après l'Art. 52 des Règles Internationales de Nomenclature il faut dans pareil cas choisir un type mais l'Appendice I qui traite du choix des types n'a pas encore été rédigé[4]. En attendant nous devons nous guider de règles de bon sens qui vraisemblablement seront incorporées un jour dans l'Appendice I. Dans l'Am. Midl. Nat. **35**: 796. 1946, C. A. Weatherby a formulé deux de ces règles, à savoir:

(1) that in choosing lectotypes the preservation of well established usage must be the primary consideration.

(2) that where usage is not a clear guide, typification by a previous author is to be accepted if in consonance with the rules and not demonstrably in error.

On pourrait ajouter à cela une liste de considérations accessoires, mais il semble bien que les deux règles précitées soient fondamentales.

Revoyons maintenant l'histoire de l'*A. parvifolia* Nuttall.

Greene semble avoir été le premier à réaliser que cette entité était hétérogène. Dans Pittonia **3**: 175. May 27, 1897 il redécrit l'*A. parvifolia* Nuttall et en élimine l'*A. rosea* Greene qu'il décrit de la manière suivante: "In its form or variety ROSEA it is a beautiful plant." Sans doute c'est là un nomen subnudum, mais l'épithète *rosea* rend l'intention évidente. A peine un mois plus tard, Rydberg publie dans le Bull. Torr. Bot. Club **24**: 299-304. June 29, 1897 un article intitulé "Antennaria dioica and its North American Allies" dans lequel il utilise *A. parvifolia* Nuttall dans le sens de *A. rosea* Greene et utilise *A. dioica* dans le sens de *A. aprica* Greene (nec *Gnaphalium dioicum* L. **2**: 856. 1753), et il décrit son *A. microphylla*. Rydberg ne semble pas avoir réalisé à ce moment que l'*A. parvifolia* Nuttall incluait originalement chacune de ces trois entités.

L'année suivante, Greene publie dans Pittonia **3**: 273-289. 1898 un article intitulé "Some northern species of ANTENNARIA" dans lequel il spécifie qu'il considère *A. parvifolia* Nuttall comme hétérogène et il en restreint de nouveau l'application dans le sens de l'*A. microphylla* Rydberg. Il élimine *A. rosea* parce que dans la description de Nuttall cet élément n'est pas inclus mais qu'il n'apparaît que comme élément secondaire dans les commentaires. Il ne semble pas que Greene ait réalisé que l'*A. parvifolia* Nuttall incluait également l'*A. aprica* qu'il décrit sur la page suivante. Dans ce même article Greene élève également son *A. parvifolia* var. *rosea* au rang d'espèce et en donne une bonne description. Enfin en page 283 il décrit l'*A. nitida* Greene qui n'est autre que la phase vernale de l'*A. microphylla* Rydberg.

Tout récemment Cronquist dans une longue note infrapaginale (Rhodora **48**: 120. 1948) discute le problème à nouveau et en conclut qu'on doit appliquer *A. parvifolia* Nuttall dans le sens de *A. aprica* Greene. Il exclut *A. rosea* Greene parce qu'élément nettement subordonné et non inclus dans la description préliminaire. Il exclut *A. microphylla* parce que cette espèce a des feuilles qui "rarely exceed 1cm in length" et que les tégules sont "white rather than yellow", alors que la description de Nuttall parle de plantes à feuilles "half or three-quarters of an inch long" et à tégules "yellow". Puis Cronquist conclut que *A. parvifolia* Nuttall doit s'appliquer dans le sens de *A. aprica* Greene

[4] Cette centurie fut préparée de juin 1948 à mai 1949 et envoyée à l'éditeur avant le congrès de 1950. Seuls les changements essentiels furent effectués après coup.

parce que ce dernier correspond à la description Nuttall pour tous les détails sauf la couleur des tégules. D'après Cronquist *A. aprica* présente "white rather than yellow phyllaries" et que "occasional otherwise representative specimens . . . have a distinct pink cast to the phyllaries" mais que "*A. aprica* may develop a yellowish tinge in drying", alors que Nuttall parle de plantes à tégules "yellow . . . sulphur yellow . . . purple".

Il faut ajouter la synonymie suivante de Rydberg dans son Fl. Rocky Mts. 918-9. 1918:

19. **A. rosea** (D.C. Eat.) Greene, *A. parvifolia* (? Nutt. in part) Rydb.

26. **A. microphylla** Rydb. *A. parvifolia* Greene, not Nutt.

30. **A. aprica** Greene. (?) *A. parvifolia* Nutt. et dans son Fl. Pr. & Pl. 825-6. 1932:

1. **A. microphylla** Rydb. *A. parvifolia* Greene, not Nutt.

2. **A. rosea** (D. C. Eat.) Greene. *A. parvifolia* Rydb., not Nutt.

Cette synonymie ne nous avance guère sauf qu'elle nous permet de constater que Rydberg a probablement été le premier à se douter que *A. parvifolia* Nuttall incluait peut-être aussi l'*A. aprica* Greene.

Pour en revenir aux deux principes énoncés plus haut il semble qu'on doit exclure *A. aprica* Greene de *A. parvifolia* Nuttall parce que *A. parvifolia* n'a jamais été interprété dans ce sens, pas même par Cronquist qui conçoit un *A. parvifolia* Nuttall sensu lato qui inclut *A. aprica* Greene, *A. rosea* Greene et *A. microphylla* Rydberg.

D'après le second principe de Weatherby on doit s'en tenir au choix de Greene et interpréter l'espèce de Nuttall dans le sens de *A. microphylla* Rydberg d'autant plus que dans la description de Nuttall l'*A. rosea* Greene est nettement un élément secondaire. De plus la description de Nuttall s'applique parfaitement à l'*A. microphylla* Rydberg sauf pour la couleur ("purple") des bractées de la plante pistillée, et cela quoi qu'en dise Cronquist. En effet plusieurs des caractères de l'*A. aprica* sensu Cronquist rappellent étrangement l'*A. microphylla* Rydberg, plante à feuilles basilaires longues de (5)-8-15-(18) mm et à tégules variant de blanches à jaune-souffre pâle dans la plante pistillée nettement jaune-souffre dans la plante staminée. Quant à *A. microphylla* sensu Cronquist, je ne suis pas certain de quelle plante il s'agit.

D'ailleurs la note infrapaginale de Cronquist est un exercice intellectuel de peu de conséquence. En effet il ne considère pas comme spécifiquement distinct ni même, apparemment, comme variétalement distinct les *A. rosea* Greene, *A. microphylla* Rydberg et *A. aprica* Greene. Dans de telles circonstances il devient absurde de considérer le matériel type de Nuttall comme étant hétérogène et la question de typification ne se pose même plus.

Enfin si Cronquist avait bien saisi les différences entre ces trois entités, il aurait sans doute admis que 3 entités aussi bien tranchées que *A. rosea* Greene, *A. microphylla* Rydberg et *A. aprica* Greene sont spécifiquement distinctes et il en aurait écrit autrement qu'il ne l'a fait.

On peut enfin ajouter qu'en 1918 H. F. Bergman dans son Flora of N. Dak. p. 299 renvoie l'*A. microphylla* Rydberg dans la synonymie de l'*A. parvifolia* Nuttall.

Je voudrais remercier le Dr. G. H. Turner et A. J. Breitung qui ont attiré ce problème à mon attention et m'ont aidé à déterrer la bibliographie.

ANTENNARIA ROSEA Greene, Pittonia 3: 281. March 21. 1898; *Antennaria dioica* (L.) Gaertner var. *rosea* D. C. Eaton, Bot. King Exp. 186. 1871 nomen nudum; *Antennaria parvifolia* Nuttall (f. sive var.) *rosea* Greene, Pittonia 3: 175, May 27, 1897 nomen subnudum. Il semble injustifié de citer cette entité de la manière suivante: *Antennaria rosea* (D. C. Eaton) Greene. En effet l'*Antennaria dioica* var. *rosea* de D. C. Eaton 1871 est un nomen nudum qui d'ailleurs n'apparaît pas lors de la mention originale de l'*Antennaria parvifolia* Nuttall (f. sive var.) *rosea* Greene, aussi un nomen subnudum. Si l'un de ces deux nomina nuda devait servir de basonyme il me semble que celui de Greene devrait avoir préséance. De plus un nomen nudum est invalide et il ne me semble pas qu'on puisse transférer un tel nom. En effet qu'arriverait-il si un botaniste moderne voulait considérer l'*A. rosea* Greene comme variété de *A. dioica* (L.) Gaertner? Il ne pourrait utiliser *A. dioica* var. *rosea* D. C. Eaton parce qu'invalide. Il lui faudrait soit publier validement ce nom d'Eaton, soit effectuer un transfert à partir de l'*A. rosea* Greene.

ARNICA CHAMISSONIS Lessing var. **incana** (Gray) stat. n., *Arnica foliosa* Nuttall var. *incana* Gray, Am. Nat. 8: 213. 1874. N'ai vu de cette variété qu'un seul spécimen canadien sans localité. B. Maguire mentionne aussi (Brittonia 4: 467. 1947) deux récoltes douteuses pour le Yukon méridional.

ASTER **Calderi** sp. n. affinis *Asteri puniceo* L. Perennis, stoloniferus, 2-6 dm alt. Caulis ± rubrotinctus, basus sparse pilosus, medius hirsutus, summus dense lanato-pilosus, pilis patentibus. Folia oblongo-linearia, interdum anguste oblongo-lanceolata, aliquantulum in tertiis imis paullum angustata, saepius integra sed nonnunquam sparse paucidenticulata, 9-12 cm long., 1.0-3.5 cm lat., superne scaberrima, inferne glabra nisi nervo medio interdum piloso, basa amplexicaulia et conspicue auriculata, summa acuta. Inflorescentia simplex, vel e capitulo uno terminali, vel racemosa et capitulis 2-6 in planta. Pedunculi erecti vel ascendentes, dense lanato-pilosi, crassi, superiores nudi 1-2 cm long., inferiores 3-6 cm long. et 1-2 foliis reductis. Capitulus 11-13 mm alt., 14-15 mm lat. Tegulae ciliatae, uni vel biseriatae omnes virides et plus minusve foliaceae, interiores lineares fere longitudinis florum, margine angusto hyalino, exteriores longiores lanceolatae fere longitudinis ligularum. Flores exteriores ligulis 12-15 mm coeruleis; interiores tubiflori corolla lutea rarius rubeola.

QUEBEC: *J. A. Calder 2642,* Fort Chimo, Hudson Bay Post, in alder thicket by edge of lake 3 miles NE of "Post", in boggy area, Aug. 15, 1948 (DAO type); *J. A. Calder 2664,* Fort Chimo area, moist spruce-larch woods just west of station, Aug. 17, 1948 (DAO).

De cette nouvelle espèce, J. A. Calder n'a rencontré que 2 colonies pendant les quelque 4 semaines de son séjour à Fort Chimo. Evidemment affine à l'*Aster puniceus* L., qui est une plante généralement allant jusqu'à 2.5 m de hauteur, à feuilles plus ou moins rétrécies à la base, nettement plus larges vers le milieu, à feuilles presque toujours denticulées, à inflorescence paniculée, à pédoncules très courts, à involucres généralement plus petits, à tégules vertes au sommet seulement, les intérieures aussi longues que les fleurs, les extérieures un peu plus courtes, ou occasionnellement foliacées, à ligules généralement longues de 1.0-1.2 cm, à fleurs tubleuses rouges à purpurines.

SENECIO TRIANGULARIS Hooker var. TRIANGULARIS, *Senecio triangularis* Hooker, Fl. Bor. Am. 1: 332-3. 1834 sensu stricto —Alberta, Colombie-Britannique et Territoires du Nord-Ouest. Aussi aux Etats-Unis. Feuilles médianes pas plus de 2 fois aussi longues que larges et généralement tronquées à la base.

SENECIO TRIANGULARIS Hooker var. ANGUSTIFOLIUS G. N. Jones — Depuis l'Alaska et le Yukon jusqu'en Washington. Feuilles médianes 2 à 5 fois aussi longues que larges, cunéaires à la base.

TARAXACUM RUSSEOLUM Dahlstedt, Rhodora 45: 341-2, 1943; *T. pseudonorvegicum* Dahlstedt, l.c., p. 340-1; *T. umbrinum* Dahlstedt, l.c., p. 342-3. *T. lacerum* sensu Polunin *pro parte* (nec Greene), Nat. Mus. Can. 92: 370-2. 1940. Sans doute cette espèce est différente du *T. lacerum* Greene, mais les deux synonymes précités ne me semblent pas spécifiquement ni variétalement distincts d'avec le *T. russeolum* Dahlstedt.

IV—Liliaceae

LES VARIATIONS CANADIENNES DU SMILACINA AMPLEXICAULIS NUTTALL

Vicariant occidental du suivant. Depuis le sud-ouest de la Saskatchewan jusqu'en Colombie-Britannique on rencontrera une plante à feuilles non caudées, qu'on pourra diviser en trois variétés. Par contraste avec le *Smilacina racemosa* (L.) Desf., on pourra charactériser le *Smilacina amplexicaulis* Nuttall comme suit: feuilles à sommet obtus, aigu ou acuminé, mais non caudé. Anthères globuleuses, longues de 0.3-0.5 mm. Style long de 0.5-1.3 mm, généralement de 1 mm ou plus en fruit. Fruit 4-5 mm de diamètre, d'un rouge pâle à maturité. Pubescence moins dense et plus courte.

SMILACINA AMPLEXICAULIS Nuttall var. AMPLEXICAULIS, *Smilacina amplexicaulis* Nuttall, Jour. Ac. Phil. 7: 58. 1834 sensu stricto. Plante haute de (5)-7-(9) dm. Feuilles elliptiques-lancéolées à lancéolées, longues de 13-20 cm. larges de 4.0-7.5 cm, acuminées au sommet, les supérieures parfois acuminées-caudées.

Distribution canadienne: Alberta et Colombie-Britannique.

SMILACINA AMPLEXICAULIS Nuttall var. **Jenkinsii** var. n. Planta (7)-9-(12) dm. Folia ab ovatis elliptica, 12-24 cm long., 7-12 cm lat.

A droite: *Ranunculus Codyanus* Boivin, type.
A gauche: *Ranunculus Buddii* Boivin, paratype.

Centre: *Aster Calderi* Boivin, type.
En haut à droite: et en haut à gauche: *Lychnis Sorensenis* Boivin, type.

Clé des variations

a. Feuilles elliptiques-lancéolées à lancéolées, environ 3-4 fois aussi longues que larges, à sommet acuminé, les supérieures parfois acuminées-caudées. Feuilles médianes longues de 13-20 cm ..... var. *amplexicaulis*

aa. Feuilles plus courtes, suborbiculaires à elliptiques, moins de 3 fois aussi longues que larges, à sommet obtus ou aigu, les supérieures parfois acuminées.

b. Feuilles ovées à elliptiques, aiguës au sommet, les supérieures parfois acuminées, les médianes longues de 12-24 cm ..... var. *Jenkinsii*

bb. Feuilles suborbiculaires à elliptiques-ovées, obtuses au sommet, les supérieures parfois aiguës. Feuilles médianes longues de 9-12 cm ..... var. *ovata*

ALBERTA: *L. Jenkins 486A,* Beaverlodge, thick poplar bush, June 26, 1948 (DAO); *L. Jenkins 730a,* Beaverlodge, thick poplar bush on Saskatoon Mt., perennial 2½ to 3½ ft., ovate leaf, June 26, 1949 (DAO type); *L. Jenkins 730b,* id., Sept. 1, 1949 (DAO); *E. H. Moss 8573,* Saskatoon Mt., near Beaverlodge, dense damp poplar-willow woods, Aug. 10, 1948 (DAO).

Dédié à Leslie Jenkins, botaniste amateur, à qui je dois d'avoir attiré mon attention sur les variations du *Smilacina amplexicaulis* Nuttall dans l'ouest du Canada. Au sujet de ces variétés, il écrit: "As far as I can determine, the ovate-leaved plant averaged at least 3 feet in height, while I measured many that were 42" or even 4 ft. in height. The linear-leaved plant — var. *amplexicaulis* — appeared to be less tall generally; I would say it averaged 24 to 30 inches in height with a maximum of 36 inches. I didn't measure the leaves of this one, but the leaves of the broad-leaved plant would cover the other ones completely in every case. In what I took to be var. *Jenkinsii* the average width of 24 leaves taken at random was 9 centimeters roughly while the average length of the same 24 was 18.4 centimeters and three of these were 22.9, 23.2, and 23.8 centimeters long. Both varieties grow abundantly on the elevation known as Saskatoon Mt. and may produce hybrids."

SMILACINA AMPLEXICAULIS Nuttall var. **ovata** var. n. Planta 4.5-6.5 dm. Folia a suborbicularibus elliptice-ovata, 9-12 cm. long., 4-8 cm lat., apice obtusa.

SASKATCHEWAN: *A. J. Breitung 5241,* Cypress Hills, occasional in aspen woods, elev. 3700 ft.; Aug. 2, 1947 (DAO type); *W. Shevkenek,* Cypress Hills, woods, July 3, 1939 (DAO); *A. J. Breitung 4377,* Cypress Hills, Birch Creek Ranger Station, fairly common in aspen woods, July 5, 1947 (DAO).

ALBERTA: *E. H. Moss 3253,* Cypress Hills, pine woods, July 11, 1935 (DAO); *A. J. Breitung 5540,* Cypress Hills, wooded north slope south of Elkwater Lake, ococasional, elev. 4200 ft., Aug. 14, 1947 (DAO); *A. J. Breitung 4184,* Cypress Hills Park, fairly common in aspen woods elev. 4000 ft. (DAO).

LES VARIATIONS CANADIENNES DU SMILACINA RACEMOSA (L.) DESF.

M. L. Fernald dans Rhodora **40**: 404-407. 1938 a défini un var. *cylindrata* Fernald et

Clé des variations:

a. Feuilles lancéolées, environ 4 fois aussi longues que larges, longues de 9-16 cm, larges de 2.5-4.0 cm; inflorescence ellipsoïde ou oblongue, longue de 3-6 cm, à peu près aussi longue que son pédoncule ..... var. *lanceolata*

aa. Feuilles elliptiques à elliptiques lancéolées, moins de 4 fois aussi longues que larges, les médianes larges de 3.5-9.5 cm.

b. Feuilles médianes elliptiques-lancéolées, longues de 10-25 cm, larges de 3.5-9.5 cm; panicule sessile ou à pédoncule moins de la moitié aussi long que l'inflorescence ovoïde ou étroitement pyramidale, longue de 7-17 cm, large de 3-10 cm ... var. *racemosa*

bb. Feuilles médianes elliptiques à elliptiques-lancéolées, longues de 8.5-17 cm, larges de 3.5-6.0 cm, pédoncule égalant au moins la moitié de la longueur de la panicule cylindrique longue de 4.5-8.5-(13.0) cm ..... var. *cylindrata*

un var. *typica* Fernald pour les variations de cette espèce dans l'est de l'Amérique du Nord. Le var. *cylindrata* Fernald a des feuilles elliptiques et une inflorescence courte, cylindrique. D'après Fernald, cette variété se rencontrerait depuis le sud de l'Ontario jusqu'en Georgie. Dans l'est du Canada, la variété la plus commune est le var. *racemosa* à feuilles elliptiques-lancéolées et à inflorescence pyramidale allongée. Dans l'Ontario on rencontre aussi une phase à feuilles lancéolées. Par contraste avec le *Smilacina amplexicaulis* Nuttall, on pourra distinguer la *Smilacina racemosa* (L.) Desf. comme suit: feuilles acuminées-caudées au sommet. Anthères ovoïdes, 0.5-1.0 mm de longueur. Style 0.2-0.7 mm de longueur, court en fruit. Fruit 5-7 mm de diamètre d'un rouge solide à maturité. Inflorescence, tige et face inférieure des feuilles densément et finement pubescentes.

SMILACINA RACEMOSA (L.) Desf. var. RACEMOSA (var. TYPICA Fernald). Distribution canadienne: de la Nouvelle-Ecosse à l'Ontario.

SMILACINA RACEMOSA (L.) Desf. var. CYLINDRATA Fernald. Se rencontrerait dans le sud de l'Ontario. Voir à ce sujet: Rhodora **40**: 406. 1938.

SMILACINA RACEMOSA (L.) Desf. var. **lanceolata** var. n. foliis lanceolatis, 9-16 cm long., 2.5-4.0 cm lat., acuminato-caudatis. Inflorescentia ellipsoidea vel oblonga, 3-6 cm long., pedunculo 2-4 cm, saepius fere longitudinis inflorescentiae. Caeteris ut var. *racemosa*.

QUEBEC: *J. A. Calder M-32,* Papineau Co., Templeton Parish, shaded woods, rich soil, June 2, 1946 (DAO).

ONTARIO: *Gillett, Calder & Cody 1223,* Prescott Co., Plantagenet North, roadside by mixed deciduous woods, sandy soil, June 17, 1947 (DAO); *A. J. Breitung 2227,* Ottawa, Beechwood Cemetery, rocky soil, common, May 23, 1946 (DAO); *J. Fletcher,* Ottawa, Stewart's Bush, rich wood, 5. 6. 1878 (DAO); *W. H. Minshall 113,* Carleton Co., Nepean Twp., Wright's Grove, open grassy slope of ravine, June 8, 1939 (DAO); *W. H. Minshall 74,* Carleton Co., Gloucester Twp., Junction Gore, railroad embankment, May 30, 1939 (DAO type); *W. Manger 27,* Meaford, woodland, May 14, 1942 (DAO); *W. J. Cody 12b,* Hamilton, rich wooded hill, May 12, 1945 (DAO); *F. T. Rosser,* Middlesex Co., London Twp., Denfield, 1934 (DAO); *W. H. Minshall 2132,* Ottawa River, Cushing Island, 2½ miles N.W. of Pembroke, wooded area, June 9, 1941 (DAO); *H. A. Senn & M. N. Zinck 247,* Durham Co., W. of Cavan, wet woods, June 12, 1941 (DAO).

V—Etudes diverses

ANDROMEDA POLIFOLIA L. var. POLIFOLIA, *Andromeda Polifolia* L., Sp. Pl. **1**: 393. 1753 sensu stricto.

ANDROMEDA POLIFOLIA L. var. **concolor** var. n. foliis inferne viridibus nec glaucis.

ALASKA: *E. H. & H. B. Looff 569,* Kodiak Island, Olga Bay, Cannery Station, tundra, June 15, 1938 (DAO type).

ARABIS CANADENSIS L.—*W. G. Dore & B. Boivin 8609,* Québec, Gatineau County, Breckenridge, Eardley Parish, 13 miles N.W. of Ottawa, along wood road at base of Precambrian escarpment, July 9, 1948 (DAO). Nouveau pour le Québec et apparemment la récolte la plus au nord pour l'espèce.

ARABIS DIVARICARPA A. Nelson var. **pinetorum** (Tid.) stat. n., *Arabis pinetorum* Tidestrom, Proc. Biol. Soc. Wash. **36**: 182. 1923.

En comparant l'abondant matériel que j'ai sous la main de l'*Arabis divaricarpa A.* Nelson var. *typica* Hopkins et de l'*Arabis Holboellii* Horn. var. *pinetorum* (Tid.) Rollins, je n'arrive pas à trouver d'autres différences entre ces deux variétés que dans la direction des pédicelles et des siliques. Il semble donc raisonnable de rattacher le var. *pinetorum* à l'*A. divaricarpa* plutôt qu'à l'*A. Holboellii.* En Saskatchewan, la variété typique est presque entièrement remplacée par le var. *pinetorum.*

ARABIS HIRSUTA (L.) Scop. var. **Minshallii** var. n. floribus fructubusque minoribus. Caulis 1.5-5.0 dm. Pubescentia patens vel appressa, intermixta e pilis simplicibus et furcatis. Sepala 2.0-2.5 mm. Petala 3-4 mm long. et circa 0.5 mm lat. Siliquae 2-3 cm long., 1 mm lat.

ONTARIO, Co. CARLETON: *W. H. Minshall,* Lemieux Island, June 26, 1934 (DAO type); *id.,* May 18, 1939 (DAO); *id.,* June 7, 1934 (DAO); *J. A. Calder 1860,* Burnt Lands, Huntley Twp., Conc. XII, in moist shallow soil over limestone, May 23, 1948 (DAO).

ARABIS RETROFRACTA Graham var. RETROFRACTA, *Arabis retrofracta* Graham, Edin. New Phil. J. 344. 1829 *sensu stricto.*

A droite: *Lychnis Gillettii* Boivin, type.
A gauche: *Viola Russellii* Boivin, type.

En 1937, Milton Hopkins publiait dans Rhodora une excellente monographie du genre *Arabis* pour l'est et le centre de l'Amérique du Nord. Quatre ans plus tard, dans la même revue, Reed C. Rollins publiait une monographie — également excellente — du genre *Arabis* pour l'ouest de l'Amérique du Nord. Ces deux études ne concordent pas toujours et plus particulièrement dans le cas des *A. Holboellii* Horn., *A. retrofracta* Graham et *A. Collinsii* Fernald (*A. pendulocarpa* pro parte). Alors que Hopkins considère ces trois entités comme espèces distinctes, Rollins les traite comme variétés d'une même espèce. Dans le cas des *A. retrofracta* Graham et *A. Collinsii* Fernald, je suis d'avis, avec Rollins, que ces deux entités sont trop voisines, présentant trop d'intermédiaires, pour qu'on les maintiennent comme espèces distinctes, mais dans le cas des *A. retrofracta* Graham et *A. Holboellii* Horn., je suis plutôt d'avis, avec Hopkins, que ces deux entités sont spécifiquement distinctes. D'où le transfert suivant:

ARABIS RETROFRACTA Graham var. **Collinsii** (Fernald) stat. n.,*Arabis Collinsii* Fernald, Rhodora 7: 31-32. 1905.

Cette variété, endémique plus à l'est, devient la phase commune de l'espèce depuis le Manitoba jusqu'en l'Alberta.

ARABIS RETROFRACTA Graham var. **multicaulis** var. n. Pubescentia omnis e pilis stellatis appressis. Flores varietatis *Collinsii*. Differt praecipuae radice perenni, caulibus numerosis, foliis paucioribus (8-12 in caule). Folia basilaria et caulinaria inferiora atque sepala et pedicelli dense pubescentia. Folia superiora inferne dense pubescentia, sed superne nunc pubescentia nunc puberulentia vel etiam glabra. Inflorescentia conspicue secunda, siliquis (4)-5.6-(7.5) cm long., ca. 1.5 mm lat.

ALBERTA: *G. H. Turner 5086,* left bank of Maligne R. at Fish Hatchery, Jasper National Park, Aug. 14, 1946 (DAO type): *G. H. Turner 5216,* left shore of Athabaska River, 3 miles above Jasper, J. National Park, Aug. 19, 1946 (DAO); *H. Groh,* Jasper, June 29, 1935 (DAO); *H. Groh,* Peace River, Sept. 13, 1934 (DAO).

YUKON: *J. W. Abbott 28,* Haines Road, mile 140, sandy land, Jan. 16, 1946 (DAO).

BETULA TERRAE-NOVAE Fernald—Le spécimen suivant semble représenter une extension d'aire vers le nord:

LABRADOR: *W. W. Judd GB 18,* Goose Bay, lower stem submerged in 1 ft. of water, Sphagnum bog, June 17, 1948 (DAO).

CHENOPODIUM GLAUCUM L. Cette espèce se rencontre au Canada sous deux formes qu'on pourra différencier comme suit:

Glomérules de fleurs réunis en épis non feuillés sauf parfois à la base. Tépales le plus souvent elliptiques ou oblongs. Plantes non pubescentes. .... var. *glaucum*

Glomérules de fleurs rapprochés en épis munis de petites feuilles presque jusqu'au sommet. Tépales le plus souvent obovés. Inflorescence généralement pubérulente au moment de la floraison .... var. *salinum*

CHENOPODIUM GLAUCUM L. var. GLAUCUM. Distribution canadienne: adventice ou naturalisé occasionnellement autour des bâtiments, dans les cultures et le long des routes, en Ontario et au Québec et aussi, d'après Standley, au Nouveau-Brunswick. Indigène sur les rivages maritimes et autres habitats salins de l'Eurasie où cette plante se rencontre également à l'état adventice. Aussi adventice aux Etats-Unis, se rencontre aussi en Asie, en Australie et en Afrique. Se rencontre également en Amérique à l'état indigène sous une forme un peu différente et généralement distincte qu'on pourra désigner comme suit:

CHENOPODIUM GLAUCUM L. var. **salinum** (Standley) stat. n.; *Chenopodium salinum* Standley N. Am. Fl. 21: 29. 1916; *Chenopodium glaucum* ssp. *salinum* (Standley) Aellen Rep. Sp. Nov. 26: 46. 1929. Distribution canadienne: indigène autour des petits lacs salés du Manitoba, de la Saskatchewan, de l'Alberta et de la Colombie-Britannique. Aussi occasionnel sur les rivages maritimes de la Baie d'Hudson et de l'Atlantique; adventice dans les sols fraîchement remués depuis l'Alberta jusqu'en Ontario (*Fletcher,* Ottawa) et au Québec (*Victorin, Rolland & Meilleur 44 694,* Nord-Témiscamingue, sur les déchets de mines de Cobalt, 17 août, 1933). Aussi aux Etats-Unis jusqu'au Nouveau-Mexique.

DESCHAMPSIA CESPITOSA (L.) Beauvois var. **intercotidalis** var. n., (2)-4-(6) dm alt., foliis laevibus, angustissimis (0.5-1.8) mm lat., fere semper involutis, ligulis 1-2-(3) mm long. Arista recta paullum brevior lemmatibus.

QUEBEC: *W. G. Dore 357,* Cap Rouge, gravel shore in intercotidal zone, July 9, 1936 (DAO type); *Victorin, Rolland, Michel & Meilleur 43 664,* co. de Montmorency, île d'Orléans, Saint-François, dans la zone intercotidale, 13 juillet, 1935 (DAO); *Marie-Anselme 147,* co. Kamouraska, Ste. Anne-de-la-Pocatière, shore of St. Lawrence River, July 21, 1939 (DAO); *R. P. Hanson 1022,* Grosse-Ile, St. Lawrence River, grows in rock crevices of upper beach, June 28, 1944 (DAO); *Victorin, Rolland, Rousseau & Meilleur 46 538,* Co. de Montmagny, Grosse-Ile, zone intercotidale des rivages estuariens, 30 juillet-1 août, 1935 (DAO); *H. Groh,* Cap Rouge, June 16, 1936 (DAO); *W. G. Dore 47-744,* Portneuf Co., Neuville, intercotidal limestone ledges, abundant, Aug. 23, 1947 (DAO).

EQUISETUM ARVENSE L. var. BOREALE (Bongard) Ruprecht f. **pseudonemorosum** f. n. Sciophilum, sterile, giganteum (4-8 dm alt.), cauli pallido-viridi, ramis elongatis (10)-15-25 cm., viridibus, patentibus vel paullum ascendentibus.

SASKATCHEWAN: *A. J. Breitung 5714,* Nine Mile Creek, Cypress Hills, common in moist spruce forest, Aug. 21, 1947 (DAO); *A. J. Breitung 5313,* Cypress Hills, Copeland Coulee, 1 mi. SW of Fort Walsh, cool moist spruce forest, common, elev. 3700 ft., Aug. 2, 1947 (DAO); *A. J. Breitung 6101,* Wallwort, common in moist woods, Sept. 11, 1947 (DAO); *A. J. Breitung 6056,* five miles east of Nipawin, common in moist rich woods, Sept. 7, 1947 (DAO); *A. J. Breitung 181,* McKague, in a spruce and alder swamp, June 23, 1939 (DAO).

ALBERTA: *B. Boivin 4853,* Hillsdale, 12 milles à l'ouest de Banff, le long du ruisseau, alt. ca. 1400 m, 21 juillet, 1946 (DAO type); *H. Groh s.n.,* High Prairie, bank of stream, Sept. 15, 1934 (DAO); *A. J. Breitung 5556,* Cypress Hills, common along creek south of Elkwater Lake, Aug. 14, 1947 (DAO); *B. O'Connor 17-12,* Astoten Lake, Elk Island National Park, Lamont, in heavy underbush among poplars, abundant, Aug. 24, 1939 (DAO).

COLOMBIE-BRITANNIQUE: *H. Groh s.n.,* Windermere, Aug. 10, 1933 (DAO); *H. Groh 812,* Peace River District, Hudson Hope, dry hills, Aug. 29, 1939 (DAO).

Elément très caractéristique des forêts de l'ouest canadien, cette forme me parut d'abord si nette et si distincte du var. *boreale* tel que je le connaissais dans l'est de l'Amérique que j'ai cru qu'il s'agissait là d'une variété nouvelle. Mais après avoir bien considéré l'*Equisetum arvense* L. f. *nemorosum* Braun, 1843, j'en ai conclu que les formes *nemorosum* et *pseudo-nemorosum* ne sont autre chose que des formes écologiques parallèles.

EQUISETUM LAEVIGATUM Braun. Les deux récoltes suivantes représentent une extension d'aire considérable à l'est des Grands Lacs:

QUEBEC: *Victorin, Rolland & Meilleur 43-148,* Saint-Jérôme, Co. du Lac Saint-Jean, "Banc-de-Sable", 17 juillet 1935 (DAO).

ONTARIO: *A. J. Breitung & H. Lloyd 3898,* Carleton Co., Torbolton Twp., Constance Bay, fairly common in open Jack Pine woods, sand dune area, June 15, 1947 (DAO).

Le premier de ces deux spécimens est quelque peu douteux. L'*Equisetum laevigatum* est typiquement une plante de la prairie, mais il se rencontre sporadiquement à l'est jusque dans le Massachusetts et il n'est nullement surprenant que cette plante se rencontre aussi sporadiquement dans le Canada oriental.

EQUISETUM PALUSTRE L. var. SIMPLICISSIMUM Braun, Am. J. Arts Sc. **46**: 85. 1844.—Syn.: *E. palustre* L. var. *americanum* Vict., Contr. Lab. Bot. Un. Mtr. **9**: 550-58. 1927.—En relisant ce texte où Victorin décrit et justifie son var. *americanum* il est bien évident, comme l'a d'ailleurs démontré M. L. Fernald dans Rhodora **49**: 278-286. 1947, que ce var. *americanum* Vict. est un nom illégitime qui doit céder la place au nom plus ancien de Braun. Et en relisant ce même texte il est évident que la description et la discussion du var. *americanum* Vict. contredisent les nombreux graphiques préparés par J. Rousseau pour illustrer ce texte. Victorin prétend que son var. *americanum* a des gaines caulinaires et raméales à dents plus longues que ces gaines elles-mêmes (il voulait sans doute dire plus longues que le tube de la gaine), tandis que la plante européenne a des gaines à dents généralement moins longues que les gaines (même remarque).

Les graphiques de J. Rousseau et plus particulièrement celui de la page 58 montrent clairement que tous les spécimens mesurés tant européens (42 spécimens) qu'américains (42 spécimens) avaient tous

des gaines caulinaires à dents beaucoup plus courtes que le tube de la gaine.

Si l'on compare entre eux les 4 graphiques de J. Rousseau et son tableau de la page 53, on constate que trois des graphiques sont inutiles, mais que du graphique de la page 58 comparé avec le tableau de la page 53 on peut extraire les caractères suivants:

E. palustre européen: gaines caulinaires à dents généralement plus courtes (27 spécimens), parfois aussi longues (9 spécimens), plus rarement plus longues (6 spécimens), que la moitié de la longueur du tube de la gaine.

E. palustre américain: gaines caulinaires à dents plus rarement plus courtes (9 spécimens), parfois aussi longues (13 spécimens), généralement plus longues (20 spécimens) que la moitié du tube de la gaine.

C'est là sans contredit une différence statistique appréciable, mais vu le manque de discontinuité morphologique on ne peut sur ce caractère seul justifier la séparation, même au rang variétal, du matériel américain. Victorin justifie encore son var. *americanum* d'après la forme des dents des gaines et la largeur relative de leur marge scarieuse. Ces caractères sont illustrés page 55, mais j'avoue que le dessin du type européen ne correspond à rien de ce que j'ai sous les yeux, c'est sans doute un cas extrême qui a été représenté là et, à l'instar de M. L. Fernald (Rhodora 49: 278-9. 1947), je trouve ces différences instables et inutilisables.

Dans la description du var. *americanum* Vict. page 51, on lit aussi: "Dents . . . raméales plus longues que ces gaines elles-mêmes." Ce caractère n'a pas été élaboré dans le texte, mais là encore, la description de Victorin ne correspond pas à la réalité. En effet tant dans le matériel européen qu'américain, les gaines raméales ont des dents nettement plus courtes que le tube de la gaine. Mais par contre mesurant les dents des gaines raméales médianes je leur trouve les dimensions suivantes:

E. palustre européen: dents des gaines raméales médianes longues de (0.5)-0.8-1.2-(1.5) mm.

E. palustre américain: dents des gaines raméales médianes longues de (1.0)-1.5-2.5-(3.0) mm.

Il y a là, comme on le constate, une différence morphologique appréciable qui, associée à la différence statistique des dents et du tube des gaines caulinaires justifie qu'on maintienne la plante américaine variétalement distincte de la phase typique européenne.

A la lecture du texte de Victorin, il appert que son var. *americanum* est un nom illégitime parce qu'antidaté par 4 autres noms variétaux qu'il a pris la peine de citer, à savoir:

E. palustre L. var. *simplicissimum* Braun, 1844

E. palustre L. var. *fallax* Milde, 1865

E. palustre L. var. *ramosissimum* Peck., 1871

E. palustre L. var. *nigridens* St. John, 1922

Victorin avait raison de maintenir l'*Equisetum palustre* L. américain comme variétalement distinct de son vicariant européen, mais Fernald avait bien raison de le chicaner sur sa phytographie et sa nomenclature.

Quant au mot latin *frons*, il a le même sens que le mot français "frondaison" qui en dérive, mais pas tout à fait le même sens que le terme botanique "fronde" un autre de ses dérivés. Les expressions *frondibus simplicibus* et *frondibus compositis* se traduisent donc littéralement par "frondaisons simples" et "frondaisons composées", ou pour employer le lingo botanique moderne: "rameaux primaires simples" et "rameaux primaires ramifiés".

Pour ce qui est des 8 formes américaines mentionnées par Fernald pour l'*Equisetum palustre* d'Amérique, je me contente d'en mentionner l'existence.

GOODYERA OBLONGIFOLIA Raf. var. OBLONGIFOLIA, *Goodyera oblongifolia* Raf., Herb. Raf. 76. 1833 sensu stricto.

Plante haute de 2-4 dm et à feuilles dépourvues de rayures blanches sauf le long de la nervure centrale. La distribution de cette forme typique est discontinue: autour du golfe Saint-Laurent depuis la Grosse-Ile et le comté de Charlevoix vers l'est jusqu'en Nouvelle-Ecosse et dans le Maine; autour des Grands Lacs; dans les monts Cyprès de la Saskatchewan; parties montagneuses de l'Alberta; depuis la Colombie-Britannique jusqu'au Nouveau-Mexique.

En Colombie-Britannique on rencontre aussi une plante plus grande à feuilles mar-

quées d'un réseau plus ou moins développé de fines lignes blanches et qu'on pourra appeler comme suit:

GOODYERA OBLONGIFOLIA Raf. var. **reticulata** var. n., 3.5-6.5 dm alt. et foliis plus minusve reticulatis e lineis albis angustissimis.

COLOMBIE-BRITANNIQUE: *F. Fyles,* Victoria, woods, Aug. 20th, 1914 (DAO type); *F. Fyles,* Revelstoke, canyon road in woods, Aug. 12, 1914 (DAO); *J. Adams,* Victoria, Sept. 26, 1917 (DAO); *J. Fletcher,* French Creek, Vancouver Island, July 30, 1903 (DAO); *I. Mounce,* Saanichton, woods, July 26, 1939 (DAO); *W. Newton,* Saanichton, Mt. Newton woods, May 20, 1939 (DAO).

HEDYSARUM MACKENZII Rich. var. MACKENZII, *Hedysarum Mackenzii* Rich., App. Franklin's Journ. 745. 1823, sensu stricto.

R. C. Rollins dans Rhodora **42**: 237. 1940 décrit cette plante comme ayant des fleurs pourpres longues de 18 à 21 mm. Les spécimens sous la main indiquent une plante à fleurs rouge-pourpre ou pourpres et longues de 16 à 20 mm. Cependant le long des grands cours d'eau qui traversent la prairie canadienne on rencontre une phase de cette espèce à fleurs plus courtes (longues de 13-15 mm) et généralement rouges ou parfois rouge-pourpre. On pourra désigner cette entité comme suit:

HEDYSARUM MACKENZII Rich. var. **Fraseri** var. n. corollis brevioribus, 13-15 mm, et saepius pallidioribus.

SASKATCHEWAN: *W. P. Fraser,* Langham, river valley, June 12 and 26, 1938 (DAO type).

ALBERTA: *G. H. Turner 2419,* river shore ½ mile or so west of Fort Saskatchewan, May 24, 1941 (DAO); *H. R. & H. R. McIntyre 3063,* Calgary, dry hillside, June 7, 1942 (DAO); *Fowler,* Calgary, July 6, 1887 (DAO).

HEDYSARUM MACKENZII Rich. var. MACKENZII f. **niveum** f.n. petalis albo-niveis.

YUKON: *J. W. Abbott 17a,* Pine Creek, sandy land, June 7, 1946 (DAO type).

LYCOPODIUM OBSCURUM L. f. **dendroideum** (Mx.) stat. n., *Lycopodium dendroideum* Mx., Fl. Bor. Am. **2**: 282. 1820.

Cette entité ne me semble pas être autre chose qu'une modification écologique propre aux habitats secs et soleilleux.

MENYANTHES TRIFOLIATA L. var. TRIFOLIATA, *Menyanthes trifoliata* L. Sp. pl. **1**: 145. 1753, sensu stricto. Se rencontre en Eurasie, Alaska, Colombie-Britannique, Alberta (Waterton) et plus au sud jusqu'en Californie. Diffère de la variété suivante par ses fleurs généralement plus larges et teintées de rose, ses folioles latérales ovées ou obovées mais occasionnellement plus étroites.

MENYANTHES TRIFOLIATA L. var. MINOR Mx. (vide Rhodora **31**: 195-8, 1929). Phase commune depuis l'Alberta vers l'est. Fleurs généralement blanches, parfois teintées de rose, et plus petites (larges de moins de 2 cm). Feuilles le plus souvent largement oblancéolées, mais variant de obovales à lancéolées.

OSMORRHIZA OBTUSA (Coulter & Rose) Fernald var. **cupressi-montanum** var. n. Altior, 5-8 dm. Umbellae 3-5. Fructus apice gradatim acuminatus vel obtiusculus. Barbae fructum ad 1 mm. long.

SASKATCHEWAN, MONTS CYPRES: *A. J. Breitung 4742,* aspen woods, uncommon, July 13, 1947 (DAO type); *J. A. Campbell 84,* moist shady woods, July 13, 1939 (DAO); *R. C. Russell & al.* wood on ridge, June 26, 1936 (DAO); *A. J. Breitung 3595,* rich aspen woods, fairly common, July 10, 1947 (DAO); *W. Shevkenek,* July 1939 (DAO).

Par sa grande taille, cette plante est facilement confondue avec l'*Osmorrhiza chilensis* Hook. & Arn. qui se rencontre aussi dans les monts Cyprès. Quant à l'*Osmorrhiza obtusa* (Coulter & Nelson) Fernald var. *obtusa* il semble manquer dans ces montagnes.

OSMORRHIZA OBTUSA (Coulter & Rose) Fernald var. OBTUSA. Plante haute de 3-5 dm. Folioles parfois lobées, ou le plus souvent devenant pinnatifides vers la base. Inflorescence, 2 ombelles terminales, rarement avec une troisième ombelle axillaire. Fruits tous ou la plupart plus courts que leur pédoncule, obtus au sommet, à barbes de moins de 1 mm de longueur.

OSMORRHIZA CHILENSIS Hook & Arn. Plante haute de 5-12 dm. Folioles grossièrement dentées, ou lobées, ou parfois trifides. Ombelles 2-4. Fruits tous ou la plupart plus longs que leur pédoncule, abruptement acuminés, à barbes atteignant 1.0-1.2 mm.

POTENTILLA EGEDII Wormsk. La variété *groenlandica* (Tratt.) Pol. ne me semble pas mériter d'être maintenue comme entité distincte. Le matériel sous la main montre que plusieurs collections contiennent et des plantes glabres et des plantes pubescentes. Plusieurs individus présentent même des jeunes feuilles pubescentes et des feuilles adultes glabres.

POTENTILLA **pratincola** nom. n., *Anserina argentea* Rydberg, North Am. Fl. 22: 353. 1908 nec *Potentilla argentea* L., Sp. Pl. 1: 497. 1753. Tout comme Hultén (Fl. Aka. Yuk. 6: 1011. 1945) je considère difficile de justifier de maintenir au rang spécifique tous les segrégats du *P. Anserina* L. décrits pour l'Amérique du Nord, mais la solution temporaire qu'il propose me semble acceptable, à savoir: de maintenir toutes ces entités au rang spécifique jusqu'à ce que nos connaissances du groupe nous permettent de proposer une classification mieux appropriée.

Le *P. pratincola* est une plante indigène de la prairie canadienne, bien différente du *P. Anserina* L. f. *sericea* (Hayne) Fernald et probablement l'une des entités qui éventuellement conserveront leur rang spécifique.

POTENTILLA **Rolandii** nom. n., *Anserina litoralis* Rydberg, N. Am. Fl. 22: 354. 1908; *Potentilla litoralis* (Rydberg) Fedde, Bot. Jahresb. 36, 2: 488. 1910 nec *Potentilla litoralis* Rydberg, Bull. Torr. Bot. Club 23: 264. 1896; *Potentilla pacifica* sensu Roland, Fl. Nova Scotia 392. 1947, nec Howell 1898; *Potentilla Egedii* var. *groenlandica* sensu Hodgson & al., Pl. Exs. Gray. No. 1353, nec Trattinick 1824.

Dédié au Dr A. E. Roland, l'auteur d'un excellent Flora of Nova Scotia.

POTENTILLA ROLANDII Boivin var. **lanata** var. n. Pedunculus ad apicem et sepala bracteolae quoque extus dense albo-lanatae.

NOUVELLE-ECOSSE: *H. T. Güssow,* Sable Island, Sept. 1911 (DAO type).

POTENTILLA YUKONENSIS Hultén. Depuis le nord du Manitoba (*J. M. Gillett 2308,* Knife Lake) et le nord de la Saskatchewan *(Senn, Groh & Russell 2852,* St. Louis) jusqu'au Yukon. Cette espèce encore mal connue est à rechercher sur les rivages graveleux des grandes nappes d'eau et sur les platières des grands cours d'eau.

ROSA ROUSSEAUIORUM Boivin f. **chrysocarpa** (Boivin) stat. n., *Rosa Rousseauiorum* var. *chrysocarpa* Boivin, Nat. Can. 72: 116. 1945.

SARRACENIA PURPUREA L. sensu stricto; *Sarracenia purpurea* var. *typica* Macfarlane, Pflanz. 4, 110: 33. 1908; *Sarazina gibbosa* Raf., Aut. Bot. 33. 1840; *Sarracenia purpurea* ssp. *gibbosa* (Raf.) Wherry, Bartonia 15: 5. 1933; *Sarazina grandiflora* Raf., Aut. Bot. 33. 1840 nomen alternativum.

Le status exact de ces noms m'est incertain, étant donné que je ne sais pas si le type de Linné, qu'on trouvera probablement dans son herbier ou peut-être dans l'herbier de l'Hortus Cliffortianus, appartient à la variété boréale (var. *terrae-novae)* ou à la variété australe (var. *venosa*).

SARRACENIA PURPUREA L. var. **ripicola** var. n. Humilior, 2.5–3.5 dm alt. Folia 5-9-(14) cm, auriculis 3.0-5.5 cm lat. Bracteolae ca 5 mm long. Sepala 16-22 mm long. Crescit in ripis humidis arenosis lacuum vel argillosis fluminum, nec in udis sphagnosis. Planta superficialis, erhizomata, vel rhizoma brevissima, foliis nunquam dissimulatis in muscis.

ONTARIO: *Dore 9003,* Bruce Co., Bruce Peninsula, Dorcas Bay, wet springy shore of Lake Huron, July 27, 1948 (DAO type); *Victorin, Rolland & Jacques 45 809,* comté de Bruce, Oliphant, sur le sable pur du rivage du lac Huron. Avec *Potentilla fruticosa, Pogonia ophioglossoides,* etc., 4 août, 1932 (DAO); *H. G. Macklin 6,* Oliphant, Bruce Co., edge of marsh, July 1, 1939 (DAO).

SASKATCHEWAN: *A. J. Breitung 6001,* Nipawin, bank of the Sask. River south of hospital, common there, Sept. 6, 1947 (DAO).

Sous sa phase commune, ou var. *terrae-novae* Pylaie, le *Sarracenia purpurea* L. est une plante des tourbières, à scape fréquemment plus grande, à feuilles longues de 10-36 cm et plus ou moins enfouies dans les sphaignes, à sépales longs de 26-40 mm et à long rhizome vertical.

SARRACENIA PURPUREA var. TERRAE-NOVAE Pylaie, Mém. Soc. Linn. Paris 6: 3 & 9. 1827; *Sarracenia purpurea venosa* sensu Wherry, Bartonia 15: 3–4. 1933, nec *Sarracenia venosa* Raf., Aut. Bot. 33. 1840, nisi proparte, i.e., syn. excl.

Comme l'a montré Wherry dans Bartonia 15: 1-6. 1930 tout notre matériel canadien de cette espèce appartient à une variété nordique distribuée depuis le Maryland et l'Illinois jusqu'au Labrador et en Alberta.

SARRACENIA PURPUREA L. var. TERRAE-NOVAE Pylaie f. **heterophylla** (Eaton) stat. n., *Sarracenia heterophylla* Eaton, Man. Bot. ed. 3: 447. 1822; *Sarracenia purpurea* var. *heterophylla* (Eaton) Torrey, Rep. Bot. Dept. Surv. N.Y. Ass. 50: 120. 1839; *Sarracenia purpurea heterophylla* (Eaton) Britton, Mem. Torr. Bot. Club 5: 176. 1894; *Sarracenia purpurea* f. *heterophylla* (Eaton) Fernald, Rhodora 24: 174. 1922.

Mutation à fleurs jaune-verdâtre et à feuilles non lignées de pourpre. Elle se rencontre occasionnellement dans l'aire de la variété. Spécimens examinés: Nouvelle-Ecosse, Québec et Ontario.

VIOLA RENIFOLIA Gray; *Viola Brainerdii* Greene, Pittonia 5: 89. 1902; *Viola renifolia* Gray var. *Brainerdii* (Greene) Fernald, Rhodora 14: 86-8. 1912. Sur 50 feuilles d'herbier de spécimens de cette espèce récoltés au Canada, 16 ont les feuilles pubescentes supérieurement et proviennent des provinces de Québec, Ontario, Saskatchewan et Alberta. C'est le var. *Brainerdii* (Greene) Fernald. Quelques spécimens ont aussi des feuilles pubérulentes supérieurement sur le lobe, glabres ailleurs; d'autres sont glabres inférieurement, pubescentes supérieurement; d'autres enfin sont hétérogènes, les spécimens d'une même feuille d'herbier appartenant à des variétés différentes. Il semble donc qu'on ne peut justifier le var. *Brainerdii* comme variété géographique. C'est tout au plus une forme susceptible de se rencontrer dans toute l'aire de l'espèce, souvent à l'état de mélange avec les autres formes de cette espèce. Tout au plus peut-on dire que le var. *Brainerdii* est moins commun que la forme typique au Canada.

VIOLA **Russellii** sp. n., *Viola vallicola* sensu Fraser & Russell, Rev. Ann. List Pl. Sask. 41. 1944, nec A. Nelson 1899. Planta puberulens, vel saepius subglabra, perennis 5-12 cm alt., multicaulis, erhizomata, estolonifera, radice pivotante crassiuscula erecta. Caulis saepius inconspicuus et 1-2 cm alt., saepius brevior quam pedunculi, interdum obscurus, rarius ad 5-8 cm elongatus. Folia plurima vel omnia ovata vel triangularia, summa rotunda, basa paulum oblique truncata, 1.5-4.5 cm long., 0.8-2.5 cm lat., nonnunquam pauca foliorum elliptica, vel orbicularia, vel basa subrotunda. Stipulae 4-6 mm, lanceolatae, integrae vel subintegrae. Flores ecthogami lutei; sepalis lanceolatis, 4.5-5.0 mm, glabris vel puberulentibus. Petala supera glabra, 8-10 mm, summa rotunda. Petala lateralia 8-10 mm, summa rotunda, in ore barbata e papillis 0.2-0.3 mm capitatis. Labellum glabrum, 10-12 mm, 7-lineatum, summum rotundum, rostro brevi 1.5-2.0 mm. Stigma abrupte capitatum. Fructus ovoideus 5 mm long., puberulens. Semen luteum, laeve, ovoideum, ambitu rotundum, 2 mm long.

SASKATCHEWAN: *R. C. Russell & B. J. Sallans,* Duval, Last Mountain, small draw on hillside, May 13, 1942 (DAO type); *R. C. Russell,* Saskatoon, open prairie, May 17, 1935 (DAO); *S. E. Clarke,* Cypress Hills, 1928 (DAO).

ALBERTA: Pincher Creek, June 23, 1902 (DAO).

COLOMBIE-BRITANNIQUE: *J. Rostock,* Keremeos, damp woods, May 1925 (DAO); *H. Groh,* Bridesville, June 2, 1931 (DAO); *A. J. Hill,* Victoria (DAO).

MONTANA: *Joe Grove,* eight miles north of Kalispel, May 23, 1930 (DAO).

GEOGRAPHICAL VARIATION IN THE BOREAL CHICKADEE EAST OF THE ROCKIES [1]

W. EARL GODFREY
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THE NEED for a revision of the races of the Boreal Chickadee, *Parus hudsonicus,* became apparent to the writer some time ago in the course of routine identification of specimens in the collection of the National Museum of Canada. Accordingly, some 600 specimens were brought together from various sources for study, these representing populations in all the Canadian provinces (except Prince Edward Island), and in Mackenzie, Yukon Territory, Alaska, New York, New Hampshire, Vermont, Michigan, and Washington.

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Six hundred specimens might seem to be an imposing number. It is far from that. The Boreal Chickadees are an exceedingly difficult group. There is but one molt annually and colour characters so obvious in fresh autumn or winter plumages usually disappear through fading and abrasion by breeding season. Much of the range is geographically remote and is difficult to reach except in summer; consequently a great proportion of the specimens in collections are worn summer adults or juvenals of little taxonomic use.

Despite the fact that there may be a certain amount of migration and seasonal shifting of individuals, we have winter specimens from the Brooks Range of Alaska and from Ungava Bay, Quebec, showing that the species winters on the northern periphery of its range. It is felt that autumn and even winter specimens usually may be depended upon to represent the race breeding in the locality in which they were collected. Like Chapman (1902) the writer places most reliance on birds in fresh autumn and winter plumages.

Added to the extreme seasonal variation in this species is a more insidious one, that of museum age. Old specimens may be faded and foxed so drastically that in colour, particularly that of pileum and other upper parts, they little resemble recently-taken specimens from the same locality. The most striking examples of this encountered by the writer are the paratypes of *P. h. ungava* Rhoads, taken in 1882-1883. The colour difference between these old skins and recently-taken topotypes is amazing. Less obvious colour changes induced by museum age have, it is felt, been a prolific source of misunderstanding and error in the past.

Pending the opportunity to examine additional material from parts of British Columbia and Alaska which will permit more accurate delimiting of the respective ranges of the races inhabiting the mountains of the West and Northwest, the present paper is limited to populations occurring east of the Rocky Mountains. The remaining western subspecies will be discussed in a future paper.

Measurements were made by the usual methods except that the bill dimension is the distance from the anterior side of the nostril to the bill tip. It is felt that this is a more accurate measurement in this particular species than is the conventional chord of the exposed culmen. Capitalized names of colours are those of Ridgway (1912). Lists of localities from which specimens were examined are not given because such a great proportion of specimens was found to be almost useless due to wear, immaturity, or museum age. Such a list would therefore mean little.

Parus hudsonicus hudsonicus Forster
Hudsonian Boreal Chickadee

Parus hudsonicus J. R. Forster, Philos. Trans., LXII, 1772, Art. 29, pp. 408, 430, (Severn River, Hudson Bay).

Parus hudsonicus ungava Rhoads, Auk, X, 1893, p. 328 (Fort Chimo, Ungava).

Penthestes hudsonicus nigricans Townsend, Auk, XXXIII, 1916, p. 74 (Shekatika, head of inlet, Saguenay Co., Quebec).

Para (sic) *hudsonicus rabbittsi* Burleigh & Peters, Proc. Biol. Soc. Washington, 61, 1948, p. 115 (St. Andrews, Newfoundland).

Subspecific characters. — Pileum and hindneck averaging Sepia, usually darker on loral and orbital regions; back, rump, and upper tail coverts varying between Brownish Olive and Hair Brown; remiges and rectrices Slate Color with paler grey edgings (becoming whitish on primary edges); suborbital

region white merging into pale grey on auricular region and Deep Gull Grey on sides of neck; chin and throat black; medial under parts white, slightly greyish on sides of chest; sides and flanks usually between Cinnamon-Brown and Russet, but variable.

Measurements. — Male (12 specimens): wing, 63.2 - 68.2 (average, 65.8) mm.; tail, 59.0-65.9 (63.2); bill, nostril to tip, 7.0-8.1 (7.7). Female (10 specimens): wing, 58.7 - 64.1 (62.8); tail, 55.5 - 63.2 (59.9); bill, nostril to tip, 6.8 - 8.0 (7.6).

Distribution. — Resident west to eastern Manitoba (Churchill and East Braintree); north to northeastern Manitoba, northern Ontario, northern Quebec (Fort Chimo and George River); south to southeastern Manitoba (East Braintree), northeastern Minnesota, northern Michigan (Newberry), southern central Ontario, and Quebec to Lake St. John, the north shore of the Gulf of St. Lawrence, Newfoundland, Anticosti Island, and apparently the Gaspé Peninsula (Gaspé County).

Comments. — A fundamental defect in much of the early taxonomic work on this species was the lack of topotypes of this, the nominate race. The writer was able to examine a series of nine such topotypes (seven of which are June-July adults) loaned by the Royal Ontario Museum of Zoology. Thus it has been possible to determine the populations to which the name *Parus hudsonicus hudsonicus* best applies. Lack of topotypes and the consequent misunderstanding of the real characters of this race are reflected, it is felt, in the proposing by authors of three races the names of which the writer considers synonyms of *Parus hudsonicus hudsonicus*.

Parus hudsonicus ungava Rhoads (1893) with type locality at Fort Chimo, south of Ungava Bay, represents the extreme of olivaceous dorsal coloration in eastern populations. In the writer's opinion it is not sufficiently different from the *hudsonicus* topotypes to constitute a valid race, however. It is clear from the list of specimens examined by Rhoads that most of the birds he called *hudsonicus* were not *hudsonicus* at all, the majority being *littoralis*. It was of course easy enough to separate the Fort Chimo specimens (in which *hudsonicus* characters appear to reach their best development) from *littoralis*. Through the courtesy of the United States National Museum the writer was able to examine eleven of Rhoads's type series, collected in 1882-83. These old skins, due evidently to museum age, now bear little resemblance either to Rhoads's (1893) description of them or to recently-taken topotypes. Their dorsal paleness and brownness contrast astoundingly with the dark pileum and much more olivaceous coloration of seasonally comparable specimens from the type locality of *ungava* (Fort Chimo) and from George River collected in 1948. However, *ungava* is obviously a synonym of the nominate race, not of *littoralis* as it is currently treated.

Parus hudsonicus nigricans of Townsend (1916) also is, in the writer's opinion, a synonym of *hudsonicus* rather than of *littoralis*. Although no specimens from the actual type locality were examined, specimens from Johan Beetz Bay (5), Natashquan (5), Moisie Bay (2), and Betchewun (4), all on the 'North Shore' were found to be in both size and colour referable to *hudsonicus*.

Parus hudsonicus rabbittsi Burleigh and Peters (1948) was originally described as possessing a decidedly paler pileum and back, with lighter flank coloration than *hudsonicus*. In fact, the authors cite the alleged paleness of it as an exception to the general tendency in Newfoundland birds to be somewhat darker than populations on the adjacent mainland. On the other hand Todd (1950) says just the opposite, that it is darker than *hudsonicus*; but he considers it barely distinguishable. In the writer's opinion *rabbittsi* is intermediate between *hudsonicus* and *littoralis* both in size and colour. It is more brownish dorsally than is average for *hudsonicus* but this would seem to be due to intermediacy toward *littoralis*. In size and average coloration it seems closer to the nominate race and the writer cannot separate a satisfactory percentage to justify considering *rabbittsi* a valid subspecies.

From localities in Quebec between Lake St. John and the St. Lawrence River the writer has examined five specimens of *hudsonicus*: two from Valcartier, and one from Lac Sergent, Charlesbourg, and Cap Rouge respectively. These birds were not taken in the breeding season and the possibility that they were local migrants cannot be excluded. Two migrant specimens from Ottawa, Ontario, are in size somewhat intermediate between *littoralis* and *hudso-*

nicus, but are referred on colour characters to the latter.

From Gaspé peninsula a most unsatisfactory series of nine, all from Gaspé county, has been examined. They are mostly worn summer adults and juvenals, with one in incomplete post-juvenal plumage. There is no doubt that this series is intermediate in size (1 post-juvenal male: wing, 65.0; tail, 63.5 mm.) but apparently they are closer to *hudsonicus* in size characters. Apparently they also are nearer to *hudsonicus* in colour, but specimens in fresh plumage are needed to determine this with complete certainty. Specimens from near Bathurst, northern New Brunswick, are available in fresh plumage and are *littoralis*.

Parus hudsonicus labradorius (Todd)
Labrador Boreal Chickadee

Penthestes hudsonicus labradorius Todd, Annals Carnegie Museum, Vol. 31, Art. 16, October 27, 1950, p. 334 (Rigolet, Newfoundland Labrador).

Subspecific Characters. — Originally described as "similar to *Penthestes hudsonicus hudsonicus* (Forster) of Hudson Bay, etc., but upperparts slightly duller brown; underparts more purely and more extensively white; and brown color of flanks paler, duller, and more restricted. Wing (type), 67; tail, 61; bill, 10; tarsus, 15.5".

Range. — Coast of Newfoundland Labrador (Rigolet, Mokkovik, and Nain).

Comments. — Through the kindness of Mr. W. E. Clyde Todd and the Carnegie Museum the writer has been permitted to examine the type series, including the type, of this newly-proposed subspecies. The type series comprises ten specimens from Rigolet (7), Mokkovik (2), and Nain (1) all in fresh (August and September) post-juvenal plumage.

The colour of the upper parts of this series appears to be within the range of individual variation in the nominate race and it is therefore doubted that *labradorius* is separable on dorsal characters. The white of the medial under parts, however, appears to be purer than in the few specimens of eastern populations in comparable plumage now available to the writer, and the brown coloration of the flanks is, in average, less extensive. However, the extent and intensity of flank coloration is a variable character in most populations of this species. Moreover all individuals of this series are immature. Whether or not the supposed differences will hold in adults can be determined with complete certainty only when such adult material in fresh plumage becomes available.

Parus hudsonicus littoralis Bryant
Acadian Boreal Chickadee

Parus hudsonicus var. *littoralis* H. Bryant, Proc. Boston Soc. Nat. Hist., IX, 1865, p. 368 (Yarmouth, Nova Scotia).

Subspecific characters. — Similar to *P. h. hudsonicus* but possesses a more brownish back and rump. It is the smallest of the races.

Measurements. — Male (11 specimens from Nova Scotia): wing, 58.0 - 64.0 (average 61.5) mm.; tail, 56.0 - 61.5 (57.6); bill, nostril to tip, 6.5 - 7.1 (6.8). Female (10 specimens from Nova Scotia): wing, 51.2 - 61.1 (57.2); tail, 53.2 - 58.3 (55.7); bill, nostril to tip, 5.8 - 7.7 (6.9).

Distribution. — North to the south side of the St. Lawrence River (excepting Gaspé peninsula) and the Maritime Provinces; south to northeastern New York, northern Vermont, northern New Hampshire, and central Maine. West at least to Compton and Stanstead Counties, Quebec, and northeastern New York.

Comments. — In fresh plumages this race is so easily separable from *hudsonicus* by its browner dorsal coloration, as well as by size, that the only explanation for the confusing of the two races, so prevalent in the literature, seems due to the use of worn breeding specimens or very old skins which are faded and foxed. An excellent series in fresh autumn and winter plumages particularly from Nova Scotia has been available for this study. Most authors, except Ridway (1904), have followed Chapman (1902) in referring all specimens of this chickadee resident east of Hudson Bay to *littoralis*. Strangely enough, Chapman considered *hudsonicus* to be browner than *littoralis*, where as the reverse actually is the case. Moreover Chapman disregarded the greater size of birds from localities north of the St. Lawrence River. Ridgway (1904), with typical perspicacity, correctly characterized *littoralis* and delimited its range with commendable accuracy considering the paucity of material available to him. He appears to have outlined the southern part of the range of *littoralis* satisfactorily but he erroneously included

southern Newfoundland, Labrador and the north shore of the Gulf of St. Lawrence, Quebec.

Specimens from northern New Brunswick, northeastern New York, and New Hampshire, have slightly greater dimensions than Nova Scotia *littoralis* but they retain the more brownish dorsal coloration of that race and therefore are referred to it. In southern Quebec specimens of *littoralis* have been examined from Hatley (6), Bury (1), Chambly Canton (1), and Saint Rose (2).

Parus hudsonicus **farleyi**[2] subsp. nov.
Alberta Boreal Chickadee

Type. — Adult male, No. 21879, National Museum of Canada collection; Lac la Nonne. Alberta; August 23, 1926; H. M. Laing.

Subspecific characters. — Similar to *P. h. hudsonicus* but paler. Readily separable also from the montane races *columbianus* and *cascadensis* by its browner and very much paler upper parts. From *evura* of Alaska, central Yukon, and northwestern Mackenzie, it differs also in more brownish and somewhat paler dorsal coloration. The extreme paleness of the grey on sides of neck separates it from all other described races.

Measurements. — Male (8 specimens): wing, 65.0 - 70.1 (average, 67.3) mm.; tail, 62.5 - 67.1 (64.7); bill, nostril to tip, 7.1 - 8.0 (7.6). Female (11 specimens): wing, 61.5 - 65.5 (average, 63.3) mm.; tail, 58.5 - 64.0 (60.9); bill, nostril to tip, 7.0 - 7.7 (7.2).

Distribution. — Resident in northern Alberta and southern Mackenzie (Simpson, Rae, and Reliance), northern Saskatchewan and northwestern Manitoba; east to western Manitoba (The Pas, Duck Mountain, Clear Lake); south to southwestern Manitoba (Clear Lake), south central Saskatchewan (Nipawin, Flotten Lake), and southern central Alberta; west to the mountain foothills of Alberta and British Columbia.

Specimens examined.—ALBERTA (Battle Lake, 1; Belvedere, 1; Chipewyan, 1; Didsbury, 3; Edmonton, 2; Grimshaw, 3; Joussard, 1; Lac la Nonne, 9; Mackenzie Highway, Mile 110, 1; Tofield, 2; Wood Buffalo Park, Government Hay Camp, 9). MANITOBA (Clear Lake, 3; Duck Mountain, 2; Reader Lake, near The Pas, 2). SASKATCHEWAN (Big River, 2; Cochrane River, 1; Emma Lake, 3; Flotten Lake, 10; Fond du Lac, 4; Mountain Cabin, 1).

Comments.—*P. h. evura* Coues, of all the described races of the species, resembles *farleyi* most closely. The former is a pale and relatively olivaceous or grey-backed subspecies, the latter a pale brown-backed one. The paler, often whitish, grey of the sides of the neck of *farleyi* also usually distinguishes it from the other races, including *evura*.

Specimens examined from southern Mackenzie (Simpson, Rae and Reliance) are very old and probably are faded and foxed. Allowing for this, however, they seem closer to *farleyi* than to *evura* of northwestern Mackenzie, etc.

[2] Named for the late Frank L. Farley, Camrose, Alberta.

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DISTRIBUTION OF THE PAPAW, *Asimina triloba* (L.) DUNAL, IN SOUTHERN ONTARIO [1] [2]

WRAY M. BOWDEN [3] *and* BERT MILLER [4]

Introduction

THERE ARE SEVERAL rare and interesting species among the native forest trees of southern Ontario. The papaw, Kentucky coffee-tree, cucumber tree, and redbud, occur in the area adjacent to Lake Erie.

The papaw, *Asimina triloba* (L.) Dunal, is the northernmost species of the tropical family Annonaceae; the northern limit of its range is in Michigan, southern Ontario, and the western part of New York State. In southern Ontario, the papaw may reach a height of from twenty-five to thirty feet. A great many trees always grow together in a grove. In some areas there is a single stand of papaws and then no more for forty or fifty miles. There may be ten trees or several hundred in one location; the roots spread underground and shoots come up around the larger trees. Some seedlings may appear, but most of the spread is by suckers. When the seeds germinate, the seedlings do not emerge until early July. After twelve to fifteen years of growth, the trees are from four to five inches in diameter (Fig. 2).

The papaw is late to begin growth in the spring, the blossoms appearing before the leaves, about the end of May. The flowers are greenish-yellow, later turning garnet brown and, finally dark purple (Fig. 3). The fruit is borne singly or in clusters up to five or seven and ripens near the end of September. The fruit is the largest fruit borne on any of our native trees. The flesh is deep yellow and is considered by some to be very good to eat. In the fall of 1949, some fruits weighed a quarter of a pound each; those from other locations were quite small. One to four carpels may develop in each flower. In a technical sense, the clusters of fruit, as shown in Fig. 4, consist of one or more aggregate fruits.

Distribution

Herbarium specimens of *Asimina triloba* collected in Ontario, were examined from five herbaria. The number of stations for each county on that basis was: Welland (1); Lincoln (4); Lambton (2); Kent (3); Essex (2); Haldimand, Norfolk, and Elgin (0). The junior author has made extensive searches for the papaw during the past several years and has found thirty-seven stations in southern Ontario: Lincoln (8); Elgin (1); Middlesex (2); Essex (2); Lambton (5); and Kent (19). Three other sight records were reported by W. Sherwood Fox and C. H. Hand. The combined herbarium and sight records total more than forty locations as shown in the map in Fig. 1. In the following list, all herbarium specimens and the sight records of new stations are cited.

Abbreviations for Herbaria:

CAN = National Museum of Canada, Ottawa
DAO = Division of Botany and Plant Pathology, Department of Agriculture, Ottawa
McM = McMaster University, Hamilton, Ontario
MICH = University of Michigan, Ann Arbor, Michigan
UT = University of Toronto, Toronto, Ontario

Abbreviations for Sight Records (= s.r.):

BM = Bert Miller
WSF = W. Sherwood Fox
CHH = C. H. Hand

Distribution of the papaw in Southern Ontario: WELLAND: near Niagara Falls, *J. Macoun, Geol. & Nat. Hist. Surv. 1387,* May 14, 1876 (CAN); Niagara Falls, *Wm. Scott,* July 5, 1898 (UT); no recent sight records. LINCOLN: near DeCew Falls, *W. J. Cody 54,* Nov. 11, 1945 (DAO, McM); near St. Catharines, at the foot of the Niagara escarpment, *W. C. McCalla 62,* May 22 and Aug. 3, 1897 (CAN, UT); Merriton, along Niagara escarpment, *J. Macoun, Geol. Surv. Dept. 1386,* June 28, 1892 (CAN); Merriton, *S. Hollingworth 90,* Oct. 15, 1885 (UT); north of St. David's Station, *Bert Miller 888,* May and Oct. 13, 1948 (McM); three stands west of St. David's, BM (s.r.); north of St. David's Station, *W. J. Cody 2051,* Oct. 18, 1948 (DAO, McM); north of St. David's Station, *J. E. & J. H. Soper 3753,* Sept. 14, 1947 (UT); near St. David's Station, *J. H. Soper and D. McCallum 2290,* July 30, 1940 (McM, DAO) and

[1] Received for publication September 23 1950.
[2] Contribution No. 1048 from the Division of Botany and Plant Pathology, Science Service, Department of Agriculture, Ottawa, Canada.
[3] Division of Botany and Plant Pathology, Department of Agriculture, Ottawa, Canada.
[4] Fort Erie, Ontario.

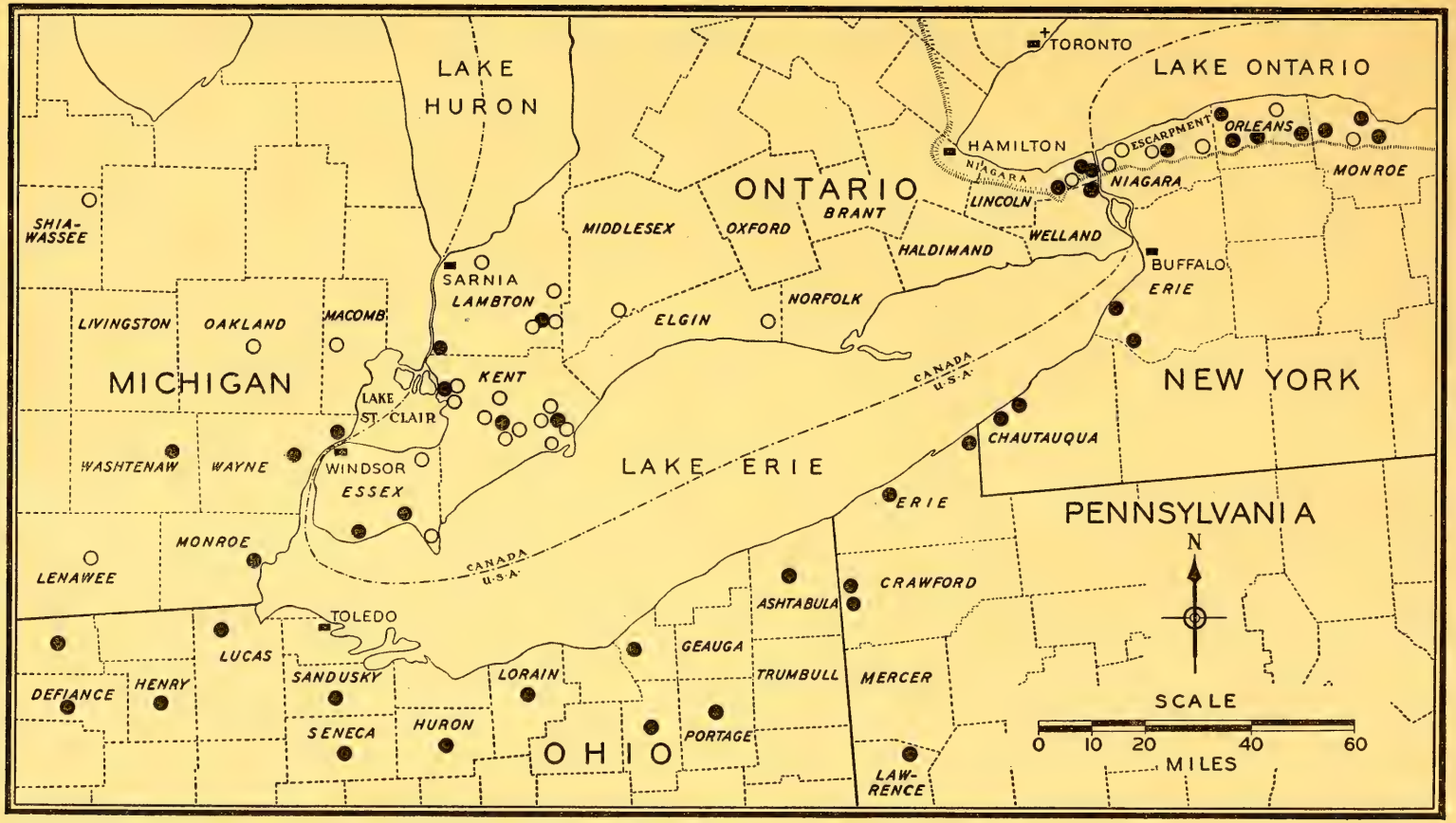

Fig. 1. Distribution of the papaw *(Asimina triloba* (L.) Dunal) in the Lake Erie area.
Symbols: dots = herbarium specimens; circles = sight records; cross = fossil (Penhallow, 1900).

Fig. 2. Papaw grove below Niagara escarpment, south of St. Catharines; photographed July 23, 1932, by W. C. McCalla.

J. H. Soper 2778, July, 25, 1941 (UT, DAO); Queenston, *J. Macoun, Geol. & Nat. Hist. Surv. 1389,* June 14, 1884 (CAN); below Queenston Heights, *J. Macoun, Geol. & Nat. Hist. Surv. 1388,* July 27, 1877 (CAN); Queenston, *Wm. Scott,* May 28, 1898 (UT); near Queenston Heights, *M. Wilkes,* May 31, 1897 (UT); 1½ miles north-west of Queenston, BM (s.r.).

ELGIN: north-west of Vienna, north bank of Otter Creek, BM (s.r.).

MIDDLESEX: 2 stands south-west of Melbourne, north side of Thames River, BM (s.r.).

ESSEX: west of Leamington, *J. Macoun, Geol. Surv. of Canada, 33, 757,* May 24 and Aug. 6, 1901 (CAN); near Colchester, *C. K. Dodge,* Sept. 19, 1911 (MICH); north-east of Woodslee, BM (s.r.); "very abundant on Point Pelee and in the townships bordering Lake Erie, between that point and Amherstburg" (Macoun, 1883); no recent sight records for Point Pelee.

LAMBTON: 3 stands near Aberfeldy, *Bert Miller,* Oct. 5, 1949 (DAO); Sombra, *T. A. Link* (DAO); Plympton Twp., between Conc. II and IV, south of Lot 9, WSF and BM (s.r.); Aughrim, east side of County, WSF (s.r.); four miles north of Alvinston, BM (s.r.).

KENT: Mitchell's Bay, Conc. XIV, Lot 15, *J. H. Soper 2828,* Aug. 11, 1941 (UT); near Morpeth, *J. H. Soper, D. McCallum and C. C. Bell 2409,* Aug. 16, 1940 (DAO); Chatham, *G. M. Stirrett,* Sept. 16, 1941 (DAO); Chatham Twp., Conc. IX, Lot 12, CHH (s.r.); Harwich Twp., Conc. IV, Lot 10, CHH (s.r.); Harwich Twp., south-east of Chatham, B.M. (s.r.); 2 stands south-east of Blenheim, BM (s.r.); 3 stands south-west of Thamesville, BM (s.r.); Howard Twp., 2 stands south-west of Thamesville, BM (s.r.); 2 stands near Morpeth, BM (s.r.); Dover Twp., 4 stands near Mitchell's Bay, BM (s.r.); north of Mitchell's Bay, BM (s.r.); south-west of Dover Centre, BM (s.r.); north-east of Paincourt, BM (s.r.).

The distribution of the papaw in southern Ontario is peculiar. At the eastern end of the area, the stands occur in a narrow strip below and north of the Niagara escarpment in Lincoln County. At the western end, almost all the locations are west of St. Thomas and are most abundant in Kent County, where twenty-one stations have been reported. In between, there is a distance of over eighty miles in Welland, Haldimand, and Norfolk Counties where papaws have never been observed with the exception of several earlier collections near Niagara Falls.

In southern Ontario, the papaw is restricted to the deciduous forest region and does not occur in the Great Lakes — St. Lawrence forest region (Halliday, 1937). The areas where the stands occur have the mildest climates in Eastern Canada, i.e. the Niagara fruit belt, Kent and Essex counties, and the Lake Erie counties (Putnam and Chapman, 1938).

In south-western Ontario, the papaw is most abundant in Kent County and rarer in Middlesex and Elgin Counties. Its spread eastward from Kent County may have been hindered by the surface topography and the kind of soil. The papaw does not occur above the 800-foot level in south-western Ontario (Putnam and Chapman, 1938, page 406). It usually grows in moist rich soil along streams, rivers, and especially river flats. A few papaws have been found in the middle of a hardwood bush. The papaws in southwestern Ontario grow in the clay plains (Chapman and Putnam, 1943, page 119), except for the region nearest to Chatham which is in the sand plains; however, these latter stations are along rivers and streams and the soil is usually rich and moist. The failure of the papaw to spread eastward may be due to the large sand plains area in Norfolk County.

In Lincoln County, the papaw occurs in the clay plains at the foot of the Niagara escarpment. Its failure to spread further westward towards Hamilton may be due to the lack of a favorable habitat since the escarpment there directly adjoins the rather dry sand plains (Chapman and Putnam, 1943). Probably the papaw has been unable to spread from Lincoln County into Welland and Haldimand Counties because all the stands in Lincoln County occur below the Niagara escarpment and transport of the fruits and seeds has been hindered.

The genus *Asimina* occurs only in North America. *Asimina triloba* at present occurs from western New York State to northern Florida, west to Nebraska and Texas. The other modern species occur in the southeastern states, mainly in Florida. There are fossils of Pleistocene species from Alaska, Wyoming, Colorado, and Texas. Fossils of a form close to *Asimina triloba* have been recorded from the late Miocene of New Jersey

(Berry, 1916). Penhallow (1900) found fossils of *Asimina triloba* in the inter-glacial beds of the Don Valley at Toronto. It appears that the papaw was formerly much more widely distributed than at present, that it was killed outright in Ontario during the Pleistocene glaciations, and was reintroduced from the surviving populations in the United States following the retreat of the glaciers.

Papaw stands are abundant in the adjacent counties of Michigan and have been reported from the following: Berrien, Cass, Lenawee, Kalamazoo, Washtenaw, Wayne, Allegan, Ingham, Oakland, Ottawa, Kent and Gratiot (Billington, 1949, page 99); Macomb (in a letter from Billington); Monroe and Hillsdale (specimens examined, Univ. Mich., Ann Arbor); Barry (specimens examined, Mich. State Coll., East Lansing); Branch (Bowden, 1949, page 2); St. Joseph, Van Buren, and Newaygo (sight records, Louis Miller, Farm Forester, Cassopolis, Mich.); Eaton and Shiawasee (sight records, George W. Parmelee). Papaws occur in the adjacent parts of western New York State (Zenkert, 1934, page 161; House, 1924, page 331). In fig. 1, the stations in Ohio are based on specimens in The Ohio State University (data from Clara Weishaupt); those in Pennsylvania from specimens in The Carnegie Museum (information supplied by Dr. Otto E. Jennings); and the stations in New York State, on specimens and sight records supplied by C. A. Zenkert (Buffalo Society of Natural Sciences) and Stanley Jay Smith (New York State Museum).

Tests on seed and ripe fruits of the papaw indicate that they will float and are in fact quite buoyant. The spread into Ontario from Michigan and New York State was probably by fruits or seeds that were water-borne or carried by mammals or man. Allen (1943) lists the papaw among the supplementary fall foods of the Michigan fox squirrel. It would seem likely that several of the native species of mammals may have influenced the spread of the papaw.

During the spring of 1948 a large number of seedling papaws were planted in a nursery plot in the Dominion Arboretum and Botanic Garden at Ottawa. More than half of these survived the winter of 1948-49 and 317 plants were growing in the fall of 1949. Of these, 182 survived the severe winter of 1949-50 and most of the surviving seedlings were growing vigorously in July, 1950. The seedlings were grown from seed collected from wild trees at Chatham, Ontario, and in Powell County, Kentucky, and from cultivated trees at Geneva, New York. This experiment indicates that winter hardiness may not be the main factor that limits the further spread of the papaw into more northern areas or regions of higher elevation. Rather, the distribution pattern, as shown in fig. 1, indicates that the natural range of the papaw is correlated with low elevation and with areas that have a sufficiently long frost-free period to permit the development of fruit. The distribution in New York and Pennsylvania is especially significant. The papaw is limited to the areas of low elevation in western New York and in the western and southern portions of Pennsylvania. In southern Ontario, the areas where the papaws grow have a much longer frost-free period than the adjacent parts of Ontario. Zenkert (1934) listed the papaw among a large number of southern species that are found in the Niagara region and emphasized the moderating effect of the Great Lakes upon the climate of the area.

The papaw occurs more generally throughout Ohio than in the other areas already mentioned. Dr. J. N. Wolfe supplied the following comments: "Papaw is rather common throughout the glaciated area in Ohio in Swamp-Forest and to some extent in Beech-Maple. It is much less common in the plateau, but where present is always in lowland sites. Elevation does not appear to be a factor in its distribution here. It occurs on poorly-drained upland underlaid by shale. It is most abundant, however, along the water courses. I know of specific stations where papaw is growing at more than 900 feet elevation."

The distribution pattern of *Asimina triloba* at its northern limit may be significant in interpreting the spread of other species from the United States into southern Ontario. Further interpretation and discussion of causes such as climates and migration routes will require more adequate data on the distribution of other critical species such as *Cercis canadensis, Liriodendron Tulipifera,* and *Magnolia acuminata.*

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Fig. 3. Detail of the flowers from trees in Fig. 2; natural size; photographed May 30, 1923, by W. C. McCalla.

Fig. 4. Detail of foliage and immature fruits; ca 3/10 natural size; from same grove as Fig. 2; photographed mid-August, 1928, by W. C. McCalla.

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ACKNOWLEDGEMENTS

We are much indebted to the institutions and individuals mentioned in the text for the loan of herbarium specimens and for additional records, and to Dr. H. A. Senn for facilitating the preparation of the manuscript.

BREEDING DIVING DUCKS ON LAKE ST. CLAIR, ONTARIO[1]

H. G. LUMSDEN,
Biologist, Ontario Department of Lands and Forests

BECAUSE there are few records of diving ducks breeding in southern Ontario, the following notes might be of interest.

J. L. Baillie has noted previous nesting records in Ontario for the Redhead *Aythya americana* (Eyton) in the Wilson Bulletin, Vol. 58, No. 2, June 1946. The most recent records mentioned were in 1900 at Toronto Island and at Walpole Island on Lake St. Clair.

In 1949 a small population of Redheads again nested on Lake St. Clair.

The estuary of the St. Clair River, which forms part of the Walpole Island Indian Reserve, contains a number of islands. These have been built up through the years with sand and silt deposited by the Bassett, Johnston and Snye Channels. They now cover an area of more than 40,000 acres. They are bordered along their southern edge by marshes which were visited by the author in the summers of 1948 and 1949. The region round the mouth of the Johnston Channel known locally as the "Bunches" was found to be of particular interest for throughout the summer of 1948 a small flock of Canvasback, Redhead, Scaup, and Ruddy Ducks remained. There is no evidence to show that any of these diving ducks nested, although they could easily have done so unobserved. A duck was sent to the Royal Ontario Museum of Zoology purporting to be a young Redhead, but was identified as a sub-adult American Golden-eye in very worn plumage.

In 1949 some flocks of diving ducks remained throughout the summer, Redhead, Canvasback, Scaup, and Ruddy Duck again being represented.

From the air on the 31st of May, 1949, several pairs of Redheads were seen on quiet bays and isolated ponds and were assumed to be holding territories.

On the 20th of July, the mouth of the Johnston Channel was visited, this time in the late evening by boat. Seven broods of Redheads were seen. Three broods of 1, 2 and 2 were still in the downy stage, while

[1] Received for publication July 31, 1950.

four broods of 4, 4, 6 and 9, were nearly half grown.

On the 27th of July a young Redhead about half grown was collected in the Bunches. The broods appeared to have joined together, one group of eleven being seen as well as other smaller broods still attended by the females.

On the 9th of August a further visit was made to make a final count of young Redheads. Two small drives were carried out in the reed beds at the mouth of the Johnston where the young diving ducks were usually found. Counting was not easy since the young Redheads dived before crossing open water. Thirty were driven out of one reed bed and 21 from another. They were all about three-quarters grown and most were unaccompanied by females.

At least 52 Redheads were hatched on Lake St. Clair in 1949.

On the flight over the marsh on 31st of May, 1949, a pair of adult Ruddy Ducks, *Oxyura jamaicensis rubida* (Wilson), were seen as well as a flock of seven in patchy plumage which were presumed to be subadults. While wading through the rushes on the 27th of July, a brood of seven was seen and four young were captured. They appeared to be newly hatched as their stomachs contained unabsorbed egg yolk and the egg tooth was still adhering to the bill of one.

This is the first record of the nesting of the Ruddy Duck, in Ontario for which there is specimen evidence. A number of writers have recorded nesting of this species prior to 1900 on the St. Clair Flats. These accounts are vague as both the Michigan and the Ontario side of the St. Clair River estuary are known as the Flats. Barrows, Langille, Collins, McIlwraith, and Morden and Saunders are among those who have recorded nestings, but only the last two positively refer to the Ontario side of the marsh.

There have been some more recent sight records of Ruddy ducks breeding in Ontario. On the 26th of June, 1947, Mrs. Gertrude Selby saw an adult with four downy young on Mud Lake at the eastern end of the Wainfleet Swamp in Welland County. These were later seen by Dr. and Mrs. J. M. Spiers. In 1948 the writer saw a brood of four half-grown young on the 15th of July at the Mud Creek Club near Mitchell's Bay in Kent County.

There must be something very attractive in this marsh in Lake St. Clair to encourage so many pairs of Redheads to nest there, nearly a thousand miles from their normal breeding range. Perhaps the answer lies in the fertility of the bottom at the mouth of the Johnston Channel resulting in a rich plant growth, and in the good interspersion of food and cover. The layer of fine silt deposited where the channel slackens its current supports a dense growth of Sago Pondweed *(Potamogeton pectinatus)* and Wild Celery *(Vallisneria spiralis)*. Strips of cover are provided by Bulrush *(Scirpus)*, Giant Bur-reed *(Sparganium)*, Cattail *(Typha)*, Arrowhead *(Sagittaria)* and Sweet Flag *(Acorus)*.

Through the centre of many of these reed beds lie dense windrows of floating plant debris, in places so thick that they will support the weight of a man. These are used as loafing spots by the ducks as the piles of droppings and quantities of feathers testify.

The well marked cycle of high and low water in the Great Lakes is bound to cause changes in this region. Since the end of the summer of 1948, the lake level has dropped two feet. It remains to be seen how these trends will affect the diving duck population there.

ANNUAL MEETING OF THE OTTAWA FIELD-NATURALISTS' CLUB, 1950

REPORT OF COUNCIL

Since the last Annual Meeting, there were five meetings of Council as follows, all held at St. Patrick's College: December 9, 1949, with 20 members present; February 24, 1950, with 13 members present; May 8, 1950, with 16 members present; September 25, 1950, with 15 members present; November 20, 1950, with 20 members present. A special meeting was also held on January 19, for the

purpose of receiving and discussing a report from Mr. A. E. Porsild, chairman of the Library Committee, relative to the disposal of the Club's library.

Appointments were made for 1950 as follows:
Editor of the Canadian Field-Naturalist — Dr. H. A. Senn.
Business Manager — Mr. W. J. Cody.
Chairman of the Publications Committee — Mr. A. E. Porsild.
Chairman of the Excursions and Lectures Committee —Miss Mary Stuart.
Chairman of the Special Lectures Committee — Dr. J. W. Groves.
Chairman of the Membership Committee — Dr. V. E. F. Solman.
Chairman of the Reserve Fund Committee — Mr. Hoyes Lloyd.
Chairman of the Bird Census Committee — Mr. A. E. Bourguignon.
Chairman of the Library Committee — Mr. A. E. Porsild.
Chairman of the Macoun Field Club — Mr. W. K. W. Baldwin.

Special features of the year's activities have been the presentation to Ottawa audiences of a third very successful series of Audubon Screen Tours, including free matinee showings in the auditoria of various Ottawa schools; the extensive use of the Club's lodge on Shirley Bay, coupled with the expansion of field excursion programmes to include a greater range of Natural History subjects; the increasing interest of school-age children in the activities of the Macoun Field Club; and the successful continuation of the Membership Committee's drive to increase enrolment in the Club.

Report of the Publications Committee

During the period December 1, 1949, to December 1, 1950, four numbers of Volume 64 of the Canadian Field-Naturalist were published, with a total of 158 pages. Papers, notes, and reviews were distributed as follows:

	Papers	Notes	Reviews
Botany	9	--	2
Entomology	1	--	2
Herpetology	1	--	--
Ichthyology	--	2	1
Invertebrate Zoology	1	1	1
Mammalogy	3	2	1
Ornithology	13	16	4
Miscellaneous	3	--	--

Thirty-five maps and six other illustrations were used.

The business manager reported sales of back numbers totalling $399.53, including a complete set sold to the University of Kansas, and a long run of 33 volumes sold to International Librairie, Brusells, Belgium. A similar run had been ordered by the University of Helsingfors, Finland.

Report of the Excursions and Lectures Committee

Six meetings of the Committee were held during the year, at which plans were made for the regular Club activities and for the business of the Field-Naturalists' Lodge.

Four indoor meetings were held, as follows:

January 19 — At a meeting held in the auditorium of the National Museum of Canada, Mr. A. W. Cameron gave a talk, illustrated with coloured film, on a summer's survey work in Newfoundland, and Dr. H. F. Lewis was commentator for a film entitled "Cruising the Labrador Coast for Seabirds".

April 18 — About 115 members and friends attended the annual dinner at the Central Experimental Farm. Mr. W. K. W. Baldwin spoke on "Robert Holmes, Naturalist and Painter of Wild Flowers". Mr. A. E. Bourguignon and members of the Macoun Field Club provided an interesting display of birds and nests. In addition, the Macoun Field Club had special exhibits showing their activities.

October 12 — A Members' Night was held in the auditorium of the Ottawa Normal School. Informal talks were given and coloured slides were shown by various members. On display during the evening was a collection of reference books purchased by the Committee for use at the Lodge, scrapbooks and other items of interest by the Macoun Field Club, and a collection of specimens, embedded in plastic by Mr. J. Arnold.

November 16 — Dr. B. Boivin, speaker at a meeting held in the Ottawa Normal School auditorium, used coloured slides to illustrate his address, "Botanical Institutions visited during the past summer in France, England, Switzerland, Sweden, and Belgium".

A special meeting was held on May 24, when some forty members attended a picnic excursion to the Lodge to mark the first anniversary of its opening. The afternoon was spent exploring the area under the direction of Mr. H. Groh.

There were eight meetings of the Bird Group, with an average attendance of about

30 members. Programmes were varied: book reviews, discussion of bird observation, films and talks, and studies of various species of birds. Five early morning bird walks were held, under the leadership of Miss Mary Stuart, Miss Verna Ross, and Messrs. Bourguignon, Groves, and Frith. A breeding-bird census was undertaken by two parties during the spring and summer. Mr. K. W. Bowles was named chairman of the Bird Group, and Miss Molly Flynn, secretary, for the 1950-51 season.

Nine Saturday afternoon excursions were held as follows:

May 6 — White Bridge.
May 13 — Gatineau Park.
May 20 — Central Experimental Farm.
May 27 — The Lodge.
June 10 — Rockcliffe.
September 9, 16, 23, and 30 — the Lodge.

A small group of interested members met twice during the fall under the leadership of Miss A. Winnifred Anderson, for the purpose of studying ferns.

Four copies of the Newsletter, totalling 30 pages, were issued during the year by the editor, Miss Verna Ross. Some 26 members contributed articles.

Report of the Special Lectures Committee

Three Audubon Screen Tours completed the series initiated in the Fall of 1949. These were:

December 13 — Saguaroland, by Karl H. Maslowski.

February 9 — This curious World in Nature, by William Ferguson.

March 13 — Canada East, by Bert Harwell.

Packed houses have greeted the visiting lecturers for the 1950-51 season, which opened with the following:

October 24 — Lakelore, by Howard L. Orians.

November 23 — Sounds of the Sageland, by Alice and Harold Allen.

Report of the Membership Committee

At a meeting held on February 14, 1950, it was agreed that the Audubon Screen Tours were an important factor in increasing local interest in the Club. Some 700 cards with names and addresses of interested persons were collected at the last lecture of the 1949-1950 season, and passed on to the Special Lectures Committee for use in their mailing list for Screen Tour literature. One thousand leaflets containing information on Club aims and activities were also distributed. Present evidence indicates that this campaign has helped materially in increasing Club membership.

Report of the Bird Census Committee

The Christmas Bird Census was taken on December 26, 1949. A total of 24 species and 1,792 individuals was reported; 17 members participated. The Bird Census Report for all of Canada was published in the March-April, 1950, issue of The Canadian Field-Naturalist.

Report of the Library Committee

The Club's Natural History library was catalogued in January, and transferred to the business premises of Mr. Bernard Amtmann, who undertook to print, at his own expense, a catalogue listing and describing the more important items. By agreement, Mr. Amtmann was to handle the sale of these books on a 40% commission, the usual figure for such transactions. A number of sales have already been made, and Mr. Amtmann has been authorized to remove the balance of the library to his new headquarters in Westmount, and to take such further action as he deems expedient in order to dispose of the books within a reasonable period.

Report of the Macoun Field Club Committee

Twenty-seven meetings were held in 1950 under the joint sponsorship of the National Museum of Canada and the Ottawa Field-Naturalists' Club. These included ten excursions to points of interest in the Ottawa district, and fourteen indoor meetings in the special project room at the National Museum linked with the Museum Saturday Morning Programme. The second birthday anniversary of the Club was celebrated in the Museum auditorium in April, sponsors, parents, teachers and friends being in attendance. Club badges were presented to twenty-three children who had qualified for membership. Mr. and Mrs. Herbert Marshall showed their own movies of wildlife in Canadian parks. Meteors and planets were studied at another special meeting under the direction of Dr. Peter Millman, and Mrs. Switzer of the Ottawa Humane Society gave a talk at still another.

A team of older members have provided the ushers for the Audubon Screen Tour lectures.

(Signed)
Pauline Snure, President. H. J. Scoggan, Secretary.

STATEMENT OF FINANCIAL STANDING
OTTAWA FIELD-NATURALISTS' CLUB, DECEMBER 1, 1950

CURRENT ACCOUNT

ASSETS

Balance in Bank, Dec. 1, 1950	$3,774.69
Bills Receivable	131.50
Lodge	400.00
	$4,306.19

RECEIPTS

Balance in Bank, Dec. 2, 1949		$2,631.10
Fees:		
Current	$1,497.26	
Advances and Arrears	160.73	
Assoc.	46.00	
		1,703.99
Separates		555.36
Single & Back Nos.		296.78
Miscellaneous		70.45
Audubon Screen Tours (Net)		1,378.85
		$6,636.53

LIABILITIES

Audubon Screen Tours (Guarantee)	$ 780.00
Balance	3,526.19
	$4,306.19

EXPENDITURES

Canadian Field-Nat. (4 nos.)	$1,426.05
Editor	100.00
Business Manager	15.00
Excursions & Lectures Comm.	75.00
Lodge	100.00
Separates	493.65
Illustrations	116.00
Postage & Stationery	255.33
Miscellaneous	54.67
Bank Discount	22.02
To Reserve Fund	199.14
Cheque o/s from 1949	5.00
Balance in Bank	3,774.69
	$6,636.53

RESERVE FUND

ASSETS

Hydro-Electric Power Comm. of Ontario Bonds	$2,000.00
Bal. in Bank, Dec. 1, 1950	134.32
	$2,134.32

RECEIPTS

Balance in Bank, Dec. 2, 1949	$ 71.86
Sale of Can. Govt. Bonds	1,819.62
From Current Acct.	199.14
Bond Interest	64.50
Bank Interest	1.32
	$2,156.44

LIABILITIES

NIL

EXPENDITURES

Purchase Hydro-Electric Bonds	2,017.12
Rent Deposit Box	5.00
Bal. in Bank, Dec. 1, 1950	134.32
	2,156.44

PUBLICATION FUND

ASSETS

Hydro-Electric Power Com. of Ontario Bonds	$1,500.00
Bal. in Bank, Dec. 1, 1950	104.52
	$1,604.52

LIABILITIES

NIL

RECEIPTS		EXPENDITURES	
Balance in Bank, Dec. 2, 1949	$ 256.11	Purchase Hydro-Electric Bonds	1,510.73
Sale of Can. Govt. Bonds	1,313.01	Bal. in Bank, Dec. 1, 1950	104.52
Bond Interest	45.00		1,615.25
Bank Interest	1.13		
	$1,615.25		

Audited and found correct.
(Signed) **HARRISON F. LEWIS,**
I. L. CONNORS,
C. FRANKTON.
AUDITORS.
December 1, 1950.

R. J. MOORE,
TREASURER.

A NEW PACIFIC BARNACLE [1]

I. E. CORNWALL, F.G.S.
Volunteer Assistant, Provincial Museum, Victoria, B.C.

Scalpellum wyethi n. sp. Figure 1. A, B, C, D.

Type. — Provincial Museum, Victoria, B.C.

Type-locality. — Approximately 800 miles East of Guam Island. Lat. 19° 52' 30" N.; Long. 161° 56' 40" E. In 1,600 fathoms.

Collected by H. E. Wyeth from the San Francisco-Manila submarine cable brought up by the Cable Ship "Restorer" in March, 1950.

Description. The capitulum of the type is 36 mm. long, 24 mm. wide; there are 14 fully calcified plates. The cuticle is thin and sparsely hairy. The plates are closely and rather strongly sculptured with even growth lines. It resembles in size and general appearance *Scalpellum darwini*[2] (an Atlantic species) but some of the plates are of very different shape, especially the carinal latera which project about one quarter of their length beyond the base of the carina.

The scutum is trapezoidal, the length more than twice the breadth. The occludent margin is convex, the apex acuminate and recurved within the ventral outline as it projects over the base of the tergum. Figure 1, B.

The tergum is trapezoidal, the carinal margin is convex. Figure 1, B.

The carina is evenly curved, and has no projection between it and the tergum as the carina is in contact with the tergum for nearly its whole length. The roof is flat and there are well developed ribs on each side of it, the outer sides of these ribs project inward and this gives the carina an H-like section. Figure 1, A.

The upper latus is nearly triangular. The lower corner is overlapped by the inframedian latus. Figure 1, B.

There is a very small rostrum shaped like a blunt V.

The inframedian latus is triangular. Figure 1, B.

The carinal latus projects beyond the base of the carina for about one quarter of its carinal margin. Figure 1, B.

The rostral latus is longer than wide, the scutal margin is curved and is in close contact with that plate. Figure 1, B.

The peduncle is oval in section, and there are about ten rows of large scales. These scales do not overlap as they are separated by cuticle like the scales on the peduncle of *Scalpellum arietinum.*[3]

The maxilla has no notch under the two upper large spines, but the margin is slightly convex and bears about ten spines of equal length. Figure 1, C.

The mandible has four teeth, the lower one has several small spines on its lower point. Figure 1, D.

The median segment of the sixth cirus has five pairs of long spines.

[1] Received for publication September 1, 1950.
[2] Scalpellum darwini Hoek. Challenger Reports, Cirripedia, p. 110.
[3] Scalpellum arietinum Pilsbry. U.S.N.M. Bul. 60, 1907.

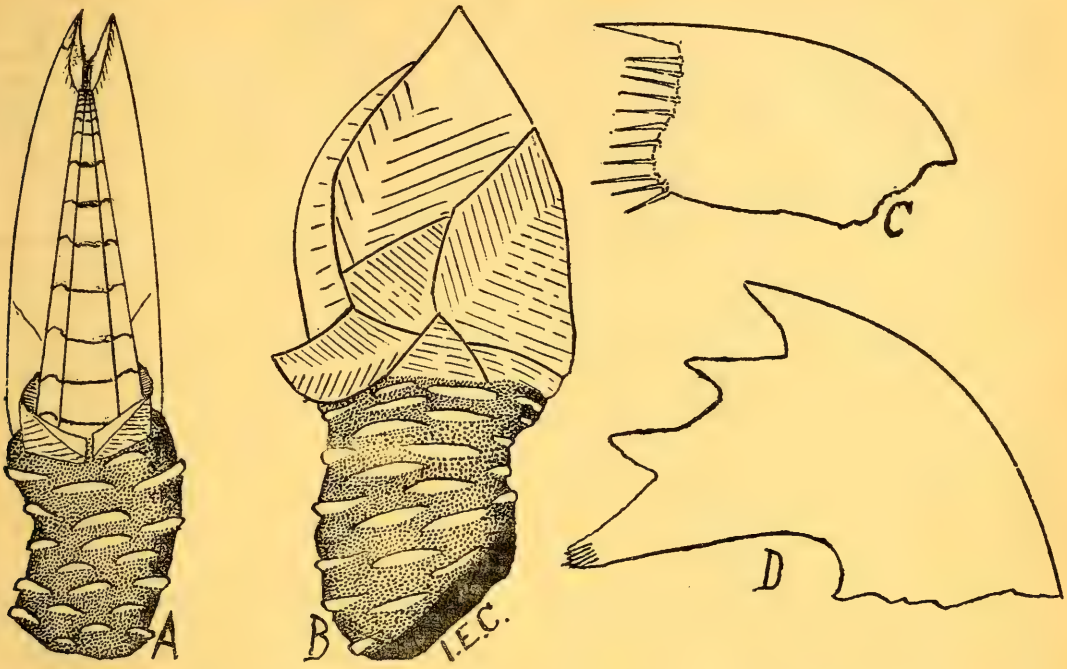

Figure 1. *Scalpellum wyethi* n. sp. A, back view to show carina. B, side view. C, maxilla. D, mandible. C and D are highly magnified.

Notes. *Scalpellum wyethi* is a very large barnacle. Several specimens were growing on the submarine cable and this part of the cable has not been raised since it was laid in 1903. Other barnacles found on the cable were *Glyptelasma carinatum* [4] and some broken shells of *Verruca.* [5]

The new species, *Scalpellum wyethi,* is named after H. E. Wyeth, navigator of the Cable Ship "Restorer" who collected the specimens.

[4] Glyptelasma carinatum (Hoek). Challenger Reports. Cirripedia, also "Papers from Dr. Th. Mortensen's Pacific Expedition 1914-1916, p: 32.
[5] Verruca. U.S.N.M. Bul. 93, p. 15.

THE SNAPPING TURTLE *(CHELYDRA SERPENTINA* L.) IN THE DUNDAS MARSH, HAMILTON, ONTARIO [1]

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IN HIS ACCOUNT of the reptiles occurring in the vicinity of Hamilton, Ontario, Brown (1) reports that the snapping turtle is "common in the Bay, marsh, and a secluded pond near LaSalle Park" and records the capture of a specimen with a carapace eight inches long. During the summers of 1946 and 1948 the writer made measurements of ten snapping turtles captured in the Dundas Marsh at Hamilton and these are recorded in Table 1.

[1] Received for publication August 25, 1950.

The measurements were made with a rule graduated to tenths of an inch and represent horizontal lengths rather than lengths following the contours of the shells.

Turtle No. 10 was captured on July 16, 1946 floating at the surface of the water in a lethargic condition. It was at first mistaken for the top of a stump since it was floating motionless and its carapace was covered with a coat of filamentous green alga. Its weight was 23 pounds, the width of the

head was 4 inches and the total length, with neck and tail extended, was 36.5 inches. Turtles Nos. 1 to 7 were trapped on July 23, 1948 in a fyke net set out by Mr. E. Turner for catching fish, in water about 45 inches deep. When the trap was raised for examination the turtles were found dead and entangled in the meshes, evidently the victims of drowning. Turtles Nos. 8 and 9 were trapped in the same way on July 30, 1948. None of the turtles mentioned in the table had reached the size (probable length of carapace, 16 inches) mentioned by Logier (3) as being attained by some specimens of this species. Turtle No. 10 (length of carapace—14.8 inches) was probably of greater than average size, for Lagler and Applegate (2) report that of 151 snappers collected from the lower peninsula of Michigan only one had a carapace of length greater than 14.5 inches.

Table 1. Snapping turtles captured in the Dundas Marsh.

Specimen	Length of carapace (inches)	Width of carapace (inches)	Length of plastron (inches)
1.	10.3	8.7	8.0
2.	11.3	9.0	9.0
3.	11.8	10.5	9.4
4.	13.0	10.2	10.2
5.	11.5	9.3	8.3
6.	11.2	8.8	8.6
7.	13.5	11.5	10.2
8.	10.5	8.3	7.5
9.	12.0	9.0	8.0
10.	14.8	12.3	10.5

The snapping turtles laid their eggs in sandy beaches and ridges along the borders of the marsh and in a railway embankment adjacent to the southern border of the marsh. On June 27, 1946 Mr. L. Wragg discovered a clutch of 35 eggs in a muskrat house at the north border of the marsh, about 50 feet from the shore. Pope (5) reports that "muskrat houses are not infrequently used" by snappers as sites for egg-laying. On Sept. 11, 1949 the writer found a nest of young snappers on the south shore of the marsh, about 20 feet from the water's edge in a sand bank sloping towards the water. The only indication of the presence of the nest was a circular hole one inch in diameter in the bank. In the hole was a small snapper with its fore claws resting on the rim of the hole and with its head poking out. The hole was carefully excavated, revealing beneath it a chamber in the soil, roughly spherical and about five inches in diameter. It was filled with 22 small turtles covered plentifully with damp sand. They were closely packed in a variety of positions, some upright, some upsidedown and some lying at oblique angles. They were in sluggish condition for they either moved not at all when picked up or feebly waved their legs and tail. After being washed in water they were seen to be dark gray in colour. Below the turtles, and buried in the sand forming the bottom of the chamber, were damp, crumpled remains of egg shells. A straight trail of small foot and tail marks led away from the rim of the hole to the marsh, indicating that other turtles of the clutch had hatched and gone to the water. This nest was similar to one examined near Winnipeg by Norris-Elye (4) in 1948. The nest at Winnipeg was shaped like a "round-bottomed flask" with maximum depth of 8.5 inches from the surface and greatest diameter 6.5 inches, and the young turtles emerged from it on Sept. 5 and 6 through an exit measuring an inch in diameter.

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(4) Norris-Elye, L. T. S. 1949 The common snapping turtle (Chelydra serpentina) in Manitoba. Can. Field-Nat., 63: 145-147.

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THE LITTLE SWAMP RATTLESNAKE IN INLAND ONTARIO[1]

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IN *The Canadian Field-Naturalist* (62 (5): 160-161. 1948) I reported the appearance of the Little Swamp Rattlesnake, or Massasauga, in October of 1947, in inland Ontario at Newbury, a village in the southwestern corner of Middlesex County. After writing the account I learned that the phenomenon was not unique for the region: more than a hundred years ago the first settlers of Glencoe, five miles east of Newbury, frequently came across specimens of the species there. Any wonder that this should be so is dispelled at once by a glance at the topography of the area: the long, narrow, swampy depression, locally known in eastern Kent and western Middlesex as Skunk's Misery, actually reaches as far east as Glencoe. "The Misery" is a perfect home for the Massasauga.

In the summer of 1949, while holidaying at Goderich, I heard that a Massasauga had been found a few days before in a different part of Ontario and at a greater distance from any of the Great Lakes than is Skunk's Misery from Lake Erie. Two weekly newspapers, the Listowel Banner and the Arthur Enterprise-News, reported that Harold Crow, a farmer living midway between Clifford and Mount Forest, had killed a rattlesnake on his farm. This lies in Minto Township in the extreme northwestern corner of Wellington County. It is forty-two miles from Kincardine, as the crow flies, forty-five from Southampton, both towns on Lake Huron, and forty-two from Owen Sound, at the southern tip of a long inlet of the Georgian Bay. With a friend I visited Mr. Crow's home. Though the body of the snake had not been kept the vivid description of it given by all members of the household left in our minds no doubt that the reptile was a Massasauga. It was a large one for the species, being between thirty and thirty-two inches long. It had been caught at the edge of a small grassy bog near the house and four or five hundred yards from a chain of muddy ponds and small lakes that empty into a feeder of the Saugeen River. The spot is a bit of ideal Massasauga country.

The Crow family told us that a friend of theirs, Joe Graham, who lives on the Kirkness farm two miles south of Mount Forest, had also seen a rattler near his home. We called there and ascertained that he had come across the snake in the Kirkness swamp about a mile from the house. It had escaped alive into the dense sedges and grasses but the young man had noted its distinctive features so carefully — rattles, markings, size and manner of movement — that he was able to give an accurate description of it. We visited the boggy tract ourselves and observed that the sluggish stream that runs through it flows into the tributary of the Saugeen that drains the lakes near the Crow home.

Here, then, are authenticated reports of two appearances of the Massasauga in inland Ontario; both appearances are associated with the upper waters of the same river system, the Saugeen. This circumstance thrusts two important facts upon our attention: first, that the last reach of the Saugeen forms the western end of the southern boundary of the Bruce Peninsula; second, that this peninsula is the greatest remaining stronghold of the Massasauga in the region of the Great Lakes. One who knows the habitat preferences of this reptile demands no further explanation of its existence in the head waters of the Saugeen River. Probably the species has always been present there but has been so uncommon as compared with its abundance in the Peninsula that it has attracted little attention.

[1] Received for publication August 8, 1950.

BIRD NOTES FROM BANKS AND VICTORIA ISLANDS [1, 2]

A. E. PORSILD,
National Museum of Canada.

DURING part of July and August, 1949 I carried out a botanical exploration of parts of Banks and Victoria Islands, N. W. T. With Holman Island on the southwest coast of Victoria Island as base, flights were made to various points on the islands. Although landings were made in ten different places in Banks Island and eleven in Victoria Island, in only one or two did time permit more than a few hours on the ground for botanical work. Because time was so limited, and because botanical investigations to me were of primary consideration, the observation and recording of birds had to be purely incidental. The following list probably is far from complete but, inasmuch as few published data exist on the birds of Banks and Victoria Island, I have thought it desirable, nevertheless, to place my few bird notes on record.

The summer of 1949 was unusually backward in the western Canadian Arctic; spring came so late that not until July 28, was a plane on floats able to land on the larger lakes near Holman Post, and not until the end of August was the first ship of the season able to reach Cambridge Bay. When, on August 20, severe frost followed by snow, ended the season in northern Banks Island, only half a dozen or so of plants had succeeded in maturing seeds while the majority were overtaken by winter when their flowers had only just opened.

Animal life, too, was greatly affected by the unfavourable season and many birds that presumably breed in Banks and Victoria Island, either did not reach their nesting grounds, or failed to breed.

ITINERARY: Following our arrival at Holman Post in southwestern Victoria Island on July 28, the first two days were spent setting up and organizing our base camp. On 30 and 31 a reconnaissance flight was made to southern Banks Island where landings were made at DeSalis Bay, Sachs Harbour and on a small lagoon near the south end of Thesiger Bay. From August 2 to 6 a flight was made from Holman Post to the head of Minto Inlet, thence east and south to the head of Prince Albert Sound, thence east to Cambridge Bay with landings at Tahoe and Washburn Lakes. On the return flight on August 7, landings were made north of Cambridge Bay and on some lakes on the south coast near Richardson Island. On August 10 a camp was set up on a lake in northeastern Banks Island, about 25 miles west of Russell Point. Bad flying weather prevented the return of our plane until August 21. During the following two days we made a flight to the west and northwest coast where we landed at Bernard Island and at Mercy Bay. Breaking camp on August 24 a landing was made on the west side of Prince of Wales Strait, about 20 miles south of Russell Point; from there we flew south to DeSalis Bay and Nelson Head. The next day, on the return flight to Holman Island, a brief landing was made at Walker Bay on Victoria Island. On August 27 I left Holman Post travelling by air by way of Coppermine, Port Radium, Yellowknife to Edmonton, Alberta.

Gavia adamsii (Gray). Yellow-billed Loon.

Common, and noted on nearly all lakes visited. From August 11 to 21 the species was noted daily on the larger lakes in the vicinity of our camp at Russell Point. No young birds were seen. No. 35121 National Museum of Canada.

Gavia arctica pacifica (Lawrence).

Pacific Loon.

Apparently common on northeastern Banks Island where it was seen on the larger lakes near Russell Point. No young birds were seen.

Gavia stellata (Pontoppidan).

Red-throated Loon.

Two pairs were seen on a small lake near Russell Point. An old nest in a marsh had not been occupied during the season of 1949, and no young birds were seen.

Cygnus columbianus (Ord.) Whistling Swan.

Observed only once when three birds were seen on a lake near DeSalis Bay in southern Banks I., on August 24.

1 For a preliminary report see: A. E. Porsild: A biological exploration of Banks and Victoria Islands, ARCTIC CIRCULAR, pp. 2-9, Jan. 1950; reprinted in ARCTIC, Vol. 3, 1 :45-54 (1950).

2 Received for publication October 4, 1950.

Branta bernicla nigricans (Lawrence).

Black Brant.

A flock of 28 birds, including some of the year, was noted at DeSalis Bay, on August 24. On July 30 numerous tracks of brant, but no birds, had been seen at Sachs Harbour on the west coast and at DeSalis Bay.

Chen hyperboreus (Pallas). Snow Goose.

Although in previous years large numbers of snow geese had been seen on the lakes of the interior of Banks Island by our pilot, Ernie Boffa, none was seen by us in either Banks or Victoria Islands, in 1949.

Clangula hyemalis (Linnaeus). Old Squaw.

The only duck noted on the lakes of Banks and Victoria Islands where it was quite common in 1949. Several flocks of fledgling young were seen near our camp at Russell Point, on August 10. Remains of a male squaw duck were seen below a duck hawk nest near Cape Lambton on Banks Island.

Somateria spectabilis (Linnaeus). King Eider.

Several flocks of eiders, probably of this species, were seen along the east and west coasts of Banks Island. The picked carcasses of 16 male King eiders were noted at the base of a cliff below the nest of a pair of duck hawks, a quarter of a mile from the coast north of Cape Lampton on Banks Island.

Falco rusticolus Linnaeus. Gyrfalcon.

A pair of gyrfalcons had nested on a cliff at the head of Mercy Bay on the north coast of Banks Island. On August 24 a completely emaciated, almost full-grown young was found dead below the nest. No. 35122 National Museum of Canada.

Falco peregrinus anatum Bonaparte. Duck Hawk.

Apparently common, and breeding wherever suitable nesting sites are found. Occupied nests were noted on Banks Island in the following places: Cape Lambton, Nelson Head and Russell Point. At the latter place three full-grown young, barely able to fly, were noted on August 24. On Victoria Island, nests were noted at the head of Minto Inlet, Holman Island and near Washburn Lake. At the latter place the nest, on August 4, contained three still unhatched eggs. No bird carcasses were seen below this nest.

Buteo lagopus s. johannis (Gmelin).

American Rough-Legged Hawk.

Rough-legged hawks were seen in flight in a number of places on Victoria and Banks Island. A nest containing what looked like full-grown young was seen on August 25 at Nelson Head, Banks Island; and another, containing three downy young and an unhatched egg, was photographed on a ledge near the head of Minto Inlet, on August 2. In the nest was the fresh remains of collared lemming. A second nest, containing downy young, was found near Washburn Lake on Victoria Island less than half a mile from the nest of a pair of duck hawks (see above).

Lagopus mutus rupestris (Gmelin).

Rock Ptarmigan.

Ptarmigans were almost entirely absent in both Victoria and Banks Islands in 1949. Although eagerly looked for, I saw none myself but a bird, presumably of this species, with a brood of young still unable to fly was reported to me near our camp at Russell Point by Mr. J. L. Jenness, on August 10.

Charadrius hiaticula semipalmatus (Bonaparte). Semipalmated Plover.

A few adult birds were seen along the beach near Holman Post, on August 9.

Squatarola squatarola (Linnaeus).

Black-bellied Plover.

A pair of adult black-bellied plovers was observed at close range on several successive days near our camp at Russell Point, between August 11 and 21.

Erolia bairdii (Coues). Baird's Sandpiper.

A few adult birds were seen near our camp at Russell Point, between August 11 and 15.

Crocethia alba (Pallas). Sanderling.

Small flocks from a few to six or more sanderlings were observed daily feeding along the sandy shore of the lake near our camp at Russell Point, between August 11 and 21. The species was not observed elsewhere.

Stercorarius longicaudus Veillot.

Long-tailed Jaeger.

A pair was noted on August 14 near our camp at Russell Point, Banks Island.

Larus argentatus Pontoppidan.

Herring Gull.

Common, and observed on nearly all lakes visited on Banks and Victoria Islands. A colony of nesting birds was visited on a cliff north of Cape Lambton on August 2. A pair of duck hawks nested on the cliff above, and

in apparent harmony with the gulls. A large colony of herring gulls nested on the south face of a mountain in Minto Inlet.

Sterna paradisaea Pontoppidan.

Arctic Tern.

A few arctic terns were seen on most lakes on Banks and Victoria Islands, and the species was seen daily near the Russell Point camp.

Nyctea scandiaca (Linnaeus). Snowy Owl.

Judging from the numbers of owl perches that everywhere in Banks and Victoria Islands are prominent features in the landscape, snowy owls must be plentiful in times of lemming abundance. In 1949, when in both islands, the lemming cycle was at the extreme low, owls were either totally absent or, at least very scarce. During our travels only one bird was seen, on a bluff in the interior of southern Banks Island.

Eremophila alpestris hoyti (Bishop).

Hoyt's Horned Lark.

The horned lark was observed only once, near our camp at Russell Point, when a young bird was collected. No. 35123 National Museum of Canada.

Corvus corax principalis Ridgway.

Northern Raven.

Not a single raven was seen in either Banks or Victoria Island, but an old nesting site was seen near Holman Post on Victoria Island.

Calcarius lapponicus (Linnaeus).

Lapland Longspur.

Longspurs were seen in most places visited, and in 1949 were the only common small land bird. A few young birds were seen near Holman Post and at our camp at Russell Point.

Plectrophenax nivalis (Linnaeus).

Snow Bunting.

Snow buntings were common wherever suitable nesting sites occurred; thus, they were plentiful in the rocky vicinity of Holman Post and at Minto Inlet on Victoria Island whereas, on Banks Island, we saw none until we reached the rocky parts of the northwest.

CHANGES IN GRASSLAND NEAR OTTAWA, ONTARIO, FOLLOWING PROLONGED FLOODING [1, 2]

D. B. O. SAVILE

AS A RESULT of a heavy winter snowfall and a very wet spring, the Ottawa River remained virtually at the record flood stage, near Ottawa, Ont., from about 1 May to 1 July, 1947. Considerable damage to vegetation resulted. This exceptional, if not unprecedented, situation is unlikely to be repeated, for not only were the weather conditions that gave rise to it most unusual, but recently constructed power and storage dams on the Ottawa River will tend to stabilize the flow. Consequently it seemed advisable to study the resultant vegetational changes and the course of recovery.

This study was made on a predominantly open area of grassland just below the Deschênes rapids, near the village of Britannia. This area is a low, slightly undulating piece of land about one half by one quarter mile. It is underlaid by Chazy shale and the soil cover is shallow, in places negligible. The shale reduces natural drainage, and pockets consequently dry out slowly. Considerable sections are permanently wet; in these the marsh vegetation suffered no obvious change. A further considerable section is above the flood level and was unaffected. The affected area, of about fifty acres' extent, is generally dry except, perhaps, in part, for a few days about 1 May.

Bare, shaly ground or boulders make up nearly 5% of the whole area, and scattered trees and shrubs somewhat over 5%. The principal woody plants are *Quercus, Ulmus, Fraxinus, Acer, Crataegus, Rosa, Vitis* and *Zanthoxylum,* and, along the shore, *Myrica gale* and *Cephalanthus occidentalis.*

The principal effect of the flood upon the breeding birds was that, whereas in 1946 savannah sparrows *(Passerculus sandwichensis)* had dominated the strip adjacent to the

[1] Contribution No. 1054 from the Division of Botany and Plant Pathology, Science Service, Department of Agriculture, Ottawa, Canada.

[2] Received for publication November 20, 1950.

river in the summer of 1946, the flood debarred them from breeding there in 1947. Late in the summer of 1947 song sparrows *(Melospiza melodia)* spread into this strip from higher ground with large shrubs where they usually predominate. In 1948, despite normal water levels, savannah sparrows were scarce and song sparrows seemingly commoner than in 1946. It has not been possible to visit the area in the breeding season since 1948, but spring and fall observations suggest that the savannah sparrows have approximately regained their 1946 status.

Casual observations of the vegetation had been made in the whole area in 1946, but no detailed floristic studies had been made. Consequently the precise make-up of the affected areas prior to flooding is not known. It is known, however, that there was a nearly continuous grass sod with relatively small amounts of dicotyledonous plants, and that there was no obvious difference between areas just above and just below the flood level. To get an approximate understanding of the probable make-up before flooding, four pairs of plots just above and below the flood mark were analyzed in early July, 1948. These plots will be discussed below.

The water level dropped abruptly in July, 1947, with the onset of warm, dry weather. When the area was visited in late July nearly all the herbaceous plants appeared to have been killed in the flooded parts, but trees and shrubs were not noticeably affected.

Dense mats of green algae covered much of the ground, particularly where shallow pools were left in slight hollows. Abundant water snails, etc., made the region attractive to killdeers *(Charadrius vociferus)*, spotted sandpipers *(Actitis macularia)*, and migrating solitary sandpipers *(Tringa solitaria)* late in July. By August the pools had largely dried and the algal mats became felted down into papery sheets.

Little more change was noted in the general appearance until late August and September, when an astonishing spread of moneywort *(Lysimachia nummularia)* became evident. In late September this plant was the dominant feature of the flora. It was the only higher plant that appeared definitely able to take immediate advantage of the denudation, and some areas of nearly an acre were almost solidly covered by it. Indeed it was the most striking indicator of the high water mark in much of the tract, both in the open and under trees or shrubs. The exact status of *L. nummularia* before 1947 is not known. A few plants had been noticed in moist, shady spots, but it is almost certain that no extensive colonies existed. The plant may have spread in to some extent from gardens in Britannia village, a short distance up stream; but it has also been found marking the 1947 flood level on the shore of Lake Deschênes some four miles above the village.

In the spring of 1948 *Lysimachia nummularia* was still the dominant flowering plant over wide areas, but, as the season progressed, the grasses began to make some recovery and various dicotyledonous plants appeared.

Table 1 gives the principal cover at the beginning of July for four plots just below the flood mark (Nos. 1-4), and four just above it (Nos. H1-H4) and adjacent to the correspondingly numbered flooded plot. As far as possible the pairs of plots were chosen from areas agreeing in slope, drainage and soil depth. Also included are four plots (Nos. 5-8) selected to represent parts of the flooded zone farther from the high water mark and to give a general picture of the flora.

Table 1 includes all plants that made up 5% or more of the area of any plot, and accounts for 93-98% of the areas of the different plots. Plants recorded in plots H1-H4, in addition to those in the table, included: *Asclepias syriaca, Cirsium arvense, Galium palustre, Medicago lupulina, Oxalis europea, Phleum pratense, Prunella vulgaris, Ranunculus acris, Rumex acetosella, Taraxacum officinale, Verbena hastata,* and miscellaneous seedlings.

Other plants recorded in plots 1-4 were: *Cirsium arvense, Oenothera perennis, Phleum pratense, Polygonum aviculare, Ranunculus acris, Trifolium hybridum, Veronica serpyllifolia,* and seedlings and sterile grasses.

Additional plants in plots 5-8 were: *Asclepias syriaca, Galium palustre, Hypericum ellipticum, Juncus tenuis, Myosotis scirpioides, Potentilla recta, Ranunculus acris, Polygonum aviculare, Taraxacum officinale, Veronica scutellata,* and seedlings.

It should be noted that at this time grasses occupied almost exactly 80% of the

Table 1. PERCENTAGE COVER IN UNFLOODED AND FLOODED PLOTS, 2 JULY, 1948, ONE YEAR AFTER FLOODING

Plot	H1	H2	H3	H4	Av. H1-H4	1	2	3	4	Av. 1-4	5	6	7	8	Av. 5-8
Soil depth (in.)	1-3.5	0-1	4+	2-4		0-3	0-1	1-6	4+		0-2	0-2.5	4+	1-3	
Bare ground	—	10	—	—	2.50	25	55	15	10	26.25	35	25	15	10	21.25
Poa pratensis	45	25	50	80	50.00	5	—	5	15	6.25	—	—	—	—	0.00
Poa compressa	40	30	—	—	17.50	—	10	15	—	6.25	20	10	15	10	13.75
Agrostis palustris	—	7	25	tr.	8.00	—	5	15	30	12.50	3	2	5	—	2.50
Agropyron repens	12	—	5	—	4.25	—	—	—	—	0.00	—	—	—	10	2.50
Lysimachia nummularia	—	—	tr.	—	tr.	30	5	45	15	23.75	2	—	45	30	19.25
Potentilla argentea	—	4	10	12	6.50	10	15	—	25	12.50	15	45	2	—	15.50
Mentha arvensis v. *villosa*	—	—	—	—	0.00	5	—	—	—	1.25	—	—	5	20	6.25
Plantago major	—	—	—	—	0.00	—	—	tr.	tr.	tr.	—	12	3	5	5.00
Verbascum thapsus	—	tr.	—	—	tr.	—	—	—	tr.	tr.	15	tr.	—	—	3.75
Carex spp.	tr.	—	1	tr.	0.25	5	2	2	2	2.75	—	—	3	tr.	0.75
Chrysanthemum leucanthemum v. *pinnatifidum*	—	15	—	—	3.75	—	—	—	—	0.00	—	—	—	—	0.00
Rorippa islandica v. *hispida*	—	—	—	—	0.00	5	tr.	tr.	—	1.25	tr.	tr.	—	5	1.25
Erigeron annuus	—	—	5	—	1.25	2	—	—	—	0.50	—	—	1	—	0.25
Rumex crispus	tr.	tr.	—	tr.	tr.	5	1	1	1	2.00	tr.	—	—	—	tr.
Ambrosia artemisiifolia v. *elatior*	—	—	—	—	0.00	3	—	—	—	0.75	—	—	—	5	1.25
Echium vulgare	—	2	—	5	1.75	—	—	—	—	0.00	tr.	—	—	—	tr.
Linaria vulgaris	tr.	—	—	tr.	tr.	—	—	—	—	0.00	5	—	—	—	1.25
Hieracium florentinum	—	5	—	—	1.25	—	—	—	—	0.00	—	—	—	—	0.00

Note.—Trace amounts (tr.) were neglected in calculating averages.

area of plots H1-H4, and other plants and bare ground 20%. By contrast, grasses occupied only 25% of the area of plots 1-4 and barely 19% of that of plots 5-8, being replaced chiefly by bare ground, *Lysimachia nummularia* and *Potentilla argentea.*

Poa pratensis, Poa compressa, Agrostis palustris, and *Agropyron repens* were the main elements of the grass sod. *P. pratensis* seems to have been most severely affected by the flooding. The figures for the other grasses are too variable for much reliance to be placed upon them.

As the season progressed, grasses and various dicotyledons gradually crowded out the *Lysimachia nummularia,* which was much less conspicuous by the end of the season.

No detailed analyses have been made since 1948, because the writer has been away from Ottawa during the period when complete identifications would be possible. However, inspections have been made during the spring and fall. The high water mark could still be detected in 1949 at several places by the abundance of *Lysimachia nummularia,* but by the fall of 1950 it was no longer visible with certainty. By that time no distinction could be seen between flooded and unflooded ground where there was appreciable soil, and recovery may be said to have been complete in these areas. Where soil is almost lacking and the ground is covered by a coarse gravel, formed by the flaking of the shale, there was still much bare ground and the cover consisted largely of *Potentilla argentea* and *Poa* spp. The exact status of this very poor ground prior to flooding is uncertain, but the proportion of bare ground was definitely less than in 1950. It is probable that the grass cover here, although it was nearly complete, was so thin that it failed to prevent the scanty soil from being washed away. Consequently recovery on this type of ground may not be complete for several years. Some of this very poor ground is slightly lower than that with appreciable soil cover, and is

accordingly more subject to flooding in years of normal precipitation. Some of the dearth of soil must, therefore, be attributed to repeated flooding; and this area, partly represented by plots 5 and 6, is not altogether comparable to the higher ground, represented by plots 1-4 and H1-H4, when the effects of the 1947 flood are considered.

The writer is indebted to Dr. B. Boivin and Dr. W. G. Dore for assistance in identifying some of the plants in the plots.

SUMMARY

A strip of grassland adjoining the Ottawa River was flooded throughout May and June, 1947. Nearly all the herbaceous plants were killed by this flood. By September, 1947, *Lysimachia nummularia* had invaded large areas of the denuded ground. During 1948 *L. nummularia* was partly replaced by *Potentilla argentea* and grasses. By September, 1950, recovery of the grass sod was almost complete, except in areas where soil is extremely scarce.

NOTES AND OBSERVATIONS

Birds in Unusual Plumages at Pimisi Bay, Ontario. — In February 1948 a Blue Jay, *Cyanocitta cristata* (Linnaeus) was caught and banded with a blue band. This bird, which by behaviour proved itself a female, possessed a white spot on the shoulders just below the nape. It was triangular in form and approximately 1½ by 1½ inches in size. There were also white feathers on the breast, which formed a small suffused and irregular patch a little to the right of the median line. Apparently this bird was a resident and observed in 1948, 1949 and 1950. She returned each fall and made irregular visits to my feeding station throughout the winters. During the springs of 1949 and 1950 she evidently bred in the neighbourhood, but, so far, no other Blue Jays in similar plumage have been seen.

On March 26, 1950, note was made of a Black-capped Chickadee, *Parus atricapillus* (Linnaeus), which had one large round dark spot on the right side of the breast and a smaller one on the left. The spots looked like dark thumb-marks and for several days I mistook them for accidental soiling of the breast feathers. When the bird was caught and examined it was found, however, that the feathers in this particular area had failed to lighten at the tips but retained their dark colour throughout.

On December 15, 1949, a Brown-headed Chickadee, *Parus hudsonicus* (Forster), appeared at my feeding station and came to the window at once. All its plumage, even to the bib and over the cheek-patches, was strongly tinted with rufous, (see colour chart, Birds of North America, F. M. Chapman, D. Appleton-Century Company, N.Y., 1940). In fact, the only places that lacked this erythristic suffusion were small oval areas far down on each side of the breast. Above, this additional tinting made the bird appear sooty olive-brown and any light edgings of the wing feathers were entirely neutralized. A further oddity was that the bird's mandibles were elongated into curved and sharply pointed tips which crossed as in a crossbill.

The bird was found to be a female, her wing measurement corresponding to her behaviour in the spring. She was a small specimen, possibly as a result of the deformity of the bill, weighing between 10.6 and 11.2 gr., wing measuring 63 mm. in December, but wearing down to 60 mm. in February. She visited the feeding station up to May 24, 1950. During this time she had at least 4 companions of her own species, two of which were banded and one which also showed a definite erythristic trend in its plumage, in that the rufous of the flanks of this bird extended almost to the black bib and the cheeks were slightly tinged with reddish. The female paired with two normally plumaged birds in succession, both of which, in turn, disappeared. But her nest, or nests, unfortunately, I never succeeded in locating.

Mr. W. Earl Godfrey of the National Museum of Canada, to whom I sent a description and a drawing of the bird in crayons, assured me (in litt.) that such a colouration of a Brown-headed Chickadee was most unusual. He said, that of 1000 skins he had examined only one was of a similar plumage. This was a male of the race *littoralis*, which he collected in Nova Scotia. P. A. Taverner's sketch of this bird, which Mr. Godfrey kindly showed me, in-

dicates that its cheeks were less strongly tinged than those of the female in question and, apparently, the upper surfaces of the wings, as well as the cap and bib, were not so dull or neutralized in colour. — LOUISE DE KIRILINE LAWRENCE, Rutherglen, Ontario.

The Nevada Cowbird at James Bay, Ontario. — On May 27, 1947, an adult female cowbird was collected at the mouth of Moose River, James Bay, Ontario, by Dr. O. H. Hewitt. This specimen, in the collection of the National Museum of Canada, was recently examined by the writer and was found to be *Molothrus ater artemisiae* Grinnell, the Nevada Cowbird. The occurrence of this western race in the James Bay region is of particular interest in connection with Todd's (1943, Can. Field-Nat., 57: 79-80) discussion of the western element in the James Bay avifauna. — W. EARL GODFREY, National Museum of Canada, Ottawa.

James Bay Sparrow at Ottawa

Ammospiza caudacuta altera Todd. James Bay Sparrow. — The specimen recorded as "*Passerherbulus nelsoni nelsoni* (Allen). Nelson's Sparrow" in 'The Birds of Ottawa, 1923" (Can. Field-Nat., Vol. 38, p. 10) has been re-examined at my request by Mr. W. Earl Godfrey, through the courtesy of St. Patrick's College, Ottawa. It proves to be an example of Todd's newly described subspecies *altera,* which has now been recognized as distinct from *nelsoni.* — HOYES LLOYD, Ottawa.

Duck Hawk at Blue Sea Lake, Quebec. — Gabrielson[1] has recorded the bird-life of this area at considerable length and has included many observations made by Taverner and me. One additional species can be added to those given by him in the papers cited.

While I was waiting for the Ottawa-bound train at Burbidge Station on the afternoon of May 25, 1923, a Duck Hawk flew past me towards the lake. It was about 150 yards away and the black cap and face markings showed beautifully clear in bright sunshine. This is my only Blue Sea Lake record for the Duck Hawk. — HOYES LLOYD, Ottawa.

Recent Ottawa District Bird Records

1. **Coturnicops noveboracensis noveboracensis** (Gmelin). Yellow Rail.

Near Cantley, Quebec, on November 14, 1948, Rowley Frith found the desiccated remains of a bird of this species impaled on a barbed wire fence. This accidental death occurred in country which is about half forest, half farmland.

2. **Stelgidopteryx ruficollis serripennis** (Audubon). Rough-winged Swallow.

A juvenile, barely able to fly, and attended by an adult was seen by Rowley Frith and me near Poupore, Quebec, on July 14, 1950. At this place a small stream was crossed by a concrete bridge which afforded possible nesting sites in its drainage holes. The young bird was easily collected by hand and affords an interesting Quebec breeding record for this species.

3. **Passerherbulus henslowii henslowii** (Audubon). Western Henslow's Sparrow.

Dr. Norman Guiou and Rowley Frith found the first evidence leading to inclusion of this species in the Ottawa list. Near Carlsbad Springs, on July 18, 1950, unknown bird notes were heard by them in a weedy hay-meadow. Frith returned on July 19 and again on July 22. On the latter date he saw a small sparrow give the characteristic abbreviated song of this species and finally concluded correctly that the stranger was a Henslow's Sparrow.

On July 24, Frith took me to the place, where we saw one bird as it sang from a weed-stem, and estimated that there were about four singing males in the colony. None sang on the evening of July 25, which was cool and windy. In spite of this, we succeeded in flushing and collecting one adult male. On July 27, several birds were heard, always under cover; and one which I followed kept a few feet ahead of me for about one hundred yards without being seen once. — HOYES LLOYD, Ottawa.

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[1] Can. Field-Nat., Vol. 52, No. 6, pp. 79-87, 1938.
Can. Field-Nat., Vol. 63, No. 4, pp. 137-143, 1949.

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PLANTS FROM THE UPPER FROBISHER BAY REGION, BAFFIN ISLAND, N.W.T., CANADA [1, 2]

J. A. CALDER [3]

A BOTANICAL SURVEY in the general vicinity of the Frobisher Bay airbase on Baffin Island in the Northwest Territories was carried out during the summer of 1948 by Dr. H. A. Senn [4] and the writer, under the auspices of the Defence Research Board of the Department of National Defence. The survey covered a period of 39 days and took place between June 23 and July 31. The primary purpose of the botanical work was to make an ecological study of the vegetation in the dominant mosquito-black fly breeding habitats and to carry out a general floristic survey of the adjacent areas.

The investigations involved, in part, the collecting of plant specimens. In all, some 750 odd numbers were collected, the majority of which were vascular plants. There was as well, however, a fair representation of the Algae, Fungi, Lichenes, Musci, and Hepaticae. Owing to the fact that no comprehensive previous botanical exploration has been carried out in this area, and, as a number of the species collected represented either new records for the Frobisher Bay region or northern range extensions for the Eastern Arctic [5], it has been thought worthwhile to prepare a briefly annotated check list of the plants collected, together with a brief and general description of the area.

The airbase is situated at the head of Frobisher Bay on Koojesse Inlet, at approximately 63°45'N 68°34'W. The plain on which the airport stands is bounded on the south-feet above sea level and composed of Archaean granites and gneisses. In general, the terrain inland is of relatively low relief, with beaches at the head of Koojesse Inlet. On the remaining three sides are low rocky hills extending to a height of some 200 to 300 east by the rocky shoreline and sand-gravel the rocky ridges rarely extending over 400 feet in height and with their axes predominantly in a northwest-southeast direction. The area has been heavily glaciated, the valleys being usually underlain by glacial debris and till (Fig. 1). Some sorting out of the coarse sands and gravels has occurred but the drainage patterns are still immature and poorly developed. Rapid melting of the snow in early June gives rise to numerous small temporary pools and extensive marshy areas throughout the valleys. By the latter part of July, many of these marshy areas had almost completely dried up. In low lying areas, however, where drainage is poor, there are permanent shallow ponds (Fig. 2) and moist sedge meadows.

During the 39-day period, the more detailed work was limited to the area in the immediate vicinity of the base. A general reconnaissance was made, however, of an area bounded on the west by the Sylvia Grinnell River, on the south by Koojesse Inlet and Frobisher Bay, and on the east by Tarr Inlet. In addition, a few trips were made inland to a depth of about 6 miles. On July 11, a brief survey was made of the limestone area at Silliman Mountain (Fig. 3) 63°43'N 68°57'W, about 15 miles to the west. The "mountain", approximately one mile in length and a few hundred feet in width, rises sharply on the northeast to a height of some 350 feet from the tidal meadow at the mouth of the Jordan River and is surrounded on the other three sides by pre-Cambrian granites. A small number of plant collections were made in this area and are denoted by an * in the list. During the period from July 11-20, Dr. T. N. Freeman made a few col-

[1] Contribution No. 1050 from the Division of Botany and Plant Pathology, Science Service, Dominion Department of Agriculture, Ottawa.

[2] Received for publication September 23, 1950.

[3] Assistant Botanist.

[4] Chief Botanist.

[5] The Eastern Arctic as delimited by N. Polunin (Botany of the Canadian Eastern Arctic: Part 1; Canada, Department of Mines and Resources, National Museum Bulletin No. 92. 1940) has been followed throughout this paper.

Vol. 65, No. 1, January-February, 1951, was issued April 11, 1951.

lections in the vicinity of the Hudson Bay Post at Ward Inlet (63°28'N 67°23'W). The symbol † is used to designate these collections.

In the preparation of the list of species, Polunin's Botany of the Eastern Arctic, Parts I, II, and III, has been extremely helpful. His notes under "Occurrence" give an accurate description of the general ecology, habitat, associations, etc., in relation to each species, and in nearly all cases the writer was able to substantiate the observations he made. As regards nomenclature, no synonym has been included, except where recent name changes have occurred or where the scientific name is not in accord with Polunin.

No attempt was made during the survey to make the complete collections of the non-vascular plants. As a consequence, the number of species represented by such groups does not give an accurate overall picture of the local flora. On the other hand, numerous collections were made of the vascular plants and, in all probability, the number of species is very close to the actual number that occur in the area. In the check list given below, not all the collection numbers for each species represented are given. Collections are only cited if the species was rare or occasional in the area, or contributed a new record for the Frobisher Bay region, or was represented by a large number of replicates[6]. Twenty-three species of vascular plants are recorded for the first time from the Frobisher Bay region, and of these five represent slight northern range extensions for the Eastern Arctic. The following list gives the total number of species for the major groups with the exception of the freshwater Algae, Lichens, and certain genera of the parasitic Fungi that are at present in the hands of specialists.

Marine Algae	10
Fungi	16
Musci	11
Hepaticae	2
Vascular Plants	149

The writer would like to express his appreciation to Dr. W. R. Taylor for identification of the marine Algae, to Dr. W. C. Steere for his determinations in the Musci and Hepaticae, and to Drs. D. B. O. Savile and J. W. Groves for identifying respectively the parasitic and fleshy Fungi.

[6] A complete set of the specimens is housed in the phanerogamic herbarium of the Division of Botany and Plant Pathology, Science Service, Department Agriculture, Ottawa. Replicate specimens have been widely distributed to botanical institutions in Europe and North America.

ALGAE

Phaeophyceae

Agarum cribrosum (Mertens) Bory
Fucus evanescens C. Agardh
Pylaiella litoralis (L.) Kjellman

Rhodophyceae

Halosaccion ramentaceum (L.) J. Agardh
Odonthalia dentata (L.) Lyngbye
Pantoneura angustissima (Turner) Kylin
Phycodrys rubens (Hudson) Batters
Ptilota pectinata (Gunner) Kjellman
Rhodophyllis dichotoma (Lep.) Gobi
Rhodymenia palmata (L.) Greville

FUNGI

Ustilaginales

Cintractia Elynae Syd. — On *Kobresia myosuroides* (Villar) Fiori & Paol.
Schizonella Elynae (Blytt) Liro. — On *Kobresia myosuroides* (Villar) Fiori & Paol.
Ustilago Bistortarum (DC.) Koern. — On *Polygonum viviparum* L.

Uredinales

Chrysomyxa Empetri (Pers.) Schroet. — On *Empetrum nigrum* L.

C. ledicola (Pk.) Lagerh. — On *Ledum palustre* L. var. *decumbens* Aiton.

C. Pyrolae (DC.) Rostr. — On *Pyrola grandiflora* Radius.

Puccinia Arenariae (Schum.) Went. — On *Arenaria peploides* L. var. *diffusa* Horn.

P. Bistortae (Str.) DC. — On *Polygonum viviparum* L.

P. Heucherae (Schw.) Diet. — On *Saxifraga nivalis* L.

P. Saxifragae-tricuspidatae P. Henning. — On *Saxifraga tricuspidata* Rottboell.

P. Ranunculi Blytt. — On *Ranunculus pedatifidus* Sm. var *leiocarpus* (Trautv.) Fernald.

Uromyces lapponicus Lagerh. — On *Oxytropis Maydelliana* Trautv.

Agaricales

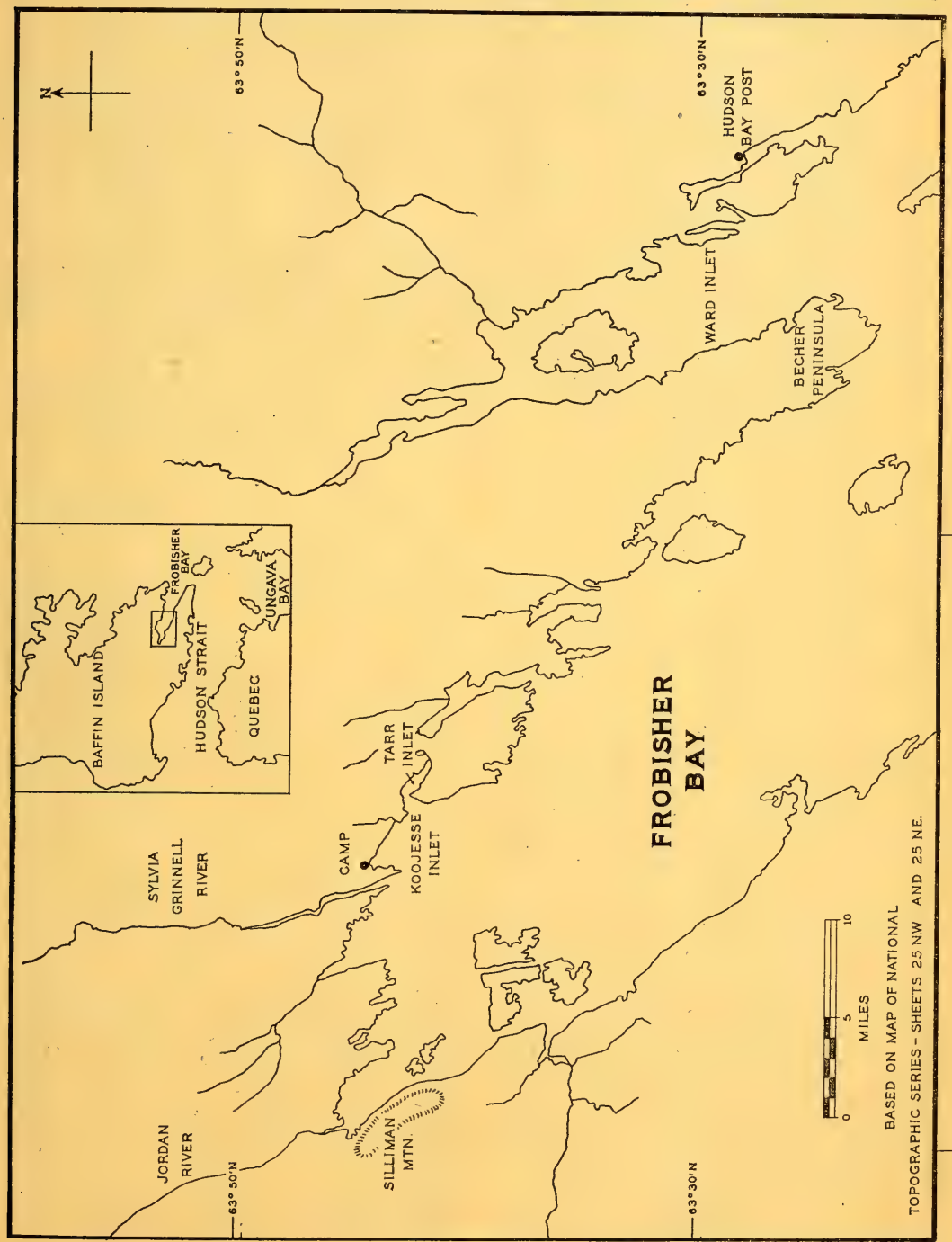
Inocybe lacera (Fr.) Quel.
Laccaria tortilis (Bolt.) Boud.
Omphalina rustica (Fr.) Quel.
O. umbellifera (Fr.) Quel.

Lycoperdales

Calvatia cretacea (Berk.) Lloyd

Musci

Amphidium lapponicum (Hedw.) Schimp.
Aulacomnium palustre (W. & M.) Schwaegr.



Map of Upper Frobisher Bay Region, Baffin Island.

Hepaticae

Marchantia polymorpha L.
Riccardia pinguis (L.) S. F. Gray

Bryum arcticum (R. Br.) Bry. Eur.
B. inclinatum (W. & M.) Sturm
B. Wrightii Sull. & Lesq.

Ceratodon purpureus (Hedw.) Brid.
Cinclidium subrotundum Lindb.
Meesea triquetra (H. & T.) Angstr.
Paludella squarrosa (Hedw.) Brid.
Pogonatum capillare (Rich.) Brid.
Polytrichum hyperboreum R. Br.

VASCULAR PLANTS

Polypodiaceae

Cystopteris fragilis (L.) Bernh. — Occasional in moist rock crevices and on sheltered rocky slopes. *Senn & Calder 3871.*

Dryopteris fragrans (L.) Schott — Noted only on three occasions in moist sheltered habitats among boulders on south-facing slopes. *Senn & Calder 3688; Calder 2049.*

Woodsia glabella Br. — Quite common in rock crevices and moist sheltered situations, though never noted as locally abundant.

Equisetaceae

Equisetum arvense L. — Occasional in shallow water along the bank of a small stream emptying into Koojesse Inlet in the camp area. Noted also on moist sheltered slopes. *Senn & Calder 3747.*

E. variegatum Schleicher — Occasional along the upper part of the sand beach in the vicinity of the camp, and along the bank of a small stream emptying into Koojesse Inlet. *Senn & Calder 3748.*

Lycopodiaceae

Lycopodium Selago L. forma **appressum** (Desvaux) Gelert — Common in a wide range of habitats, especially on the dry lichen-heath and in the sedge meadows. Widespread but never noted as locally abundant.

Potamogetonaceae

Potamogeton filiformis Persoon var. **borealis** (Raf.) St. John — Rare. A single colony was found in shallow water and along the margins of a small freshwater pond about one mile north of the base. *Senn & Calder 3942.* Polunin reports this species from Cape Smith in northern Quebec, and Rankin Inlet on the west coast of Hudson Bay. This collection represents a new record for Baffin Island and a slight northern range extension for the Eastern Arctic.

Gramineae

†**Agrostis borealis** Hartman — Rare. Collected only once in the general vicinity of the camp along the upper margins of the sand beach bordering Koojesse Inlet. *Calder 2179.* Quite common as well on the dry sandy beach near the Hudson Bay Post at Ward Inlet, *Freeman s.n.,* July 19, 1948. These two records are the first for the Frobisher Bay area.

Alopecurus alpinus Sm. — Although reported from numerous localities on Baffin Island, this species was rare in the area, being restricted to the moist humus habitats around the old Eskimo dwelling sites along the east bank of the Sylvia Grinnell River. *Senn & Calder 3961; Calder 2063.*

Arctagrostis latifolia (Br.) Gris. — Common in moist habitats, especially along the margins of ponds, in the damp heath areas, and in the damper situations along the upper margins of the sand beaches.

Deschampsia pumila (Led.) Ost. — Rare. Collected on only two occasions, once along the gravel bank of a shallow brackish pond just above high-tide level, and once along the sandy beach bordering Koojesse Inlet. *Senn & Calder 3887; Calder 2084,* respectively. Previously unrecorded from the Frobisher Bay region.

Dupontia Fisheri Br. — Common in a variety of moist habitats. Noted especially in the marshy meadows, along the more muddy shorelines in the sheltered bays, and at the mouths of the streams emptying into Koojesse Inlet. The typical phase was not noted in the area, the majority of the collections being represented by f. **psilosantha** (Ruprecht) Pol., *Senn & Calder 3789, Calder 2111.* Var. **aristata** Malte ex Pol. was collected on two occasions, *Senn & Calder 3892; Calder 4031.*

Elymus arenarius L. var. **villosissimus** (Scribner) Pol. — Occasional along the lower limits of the sand beaches in the zone just above high-water mark. *Senn & Calder 3843.*

Festuca baffinensis Pol. — Apparently rare though possibly overlooked. Represented by a few plants collected on the floor of an old Eskimo stone house on the east bank of the Sylvia Grinnell River. *Senn & Calder 4009.* Previously unrecorded for the Frobisher Bay region.

†**F. brachyphylla** Schultes — Common. Represented by a number of collections the majority of which were made in the more open communities on the sand and gravel ridges, and along the upper margins of the sand beaches. Forma **flavida** Pol. was col-

Fig. 1. Aerial photograph taken on July 1 in the vicinity of Burton Bay about 10 miles southeast of Koojesse Inlet.

lected on two occasions, once on a dry gravel bank along the margin of the Sylvia Grinnell River, and once on a rocky ridge near the Eskimo village. *Senn & Calder 3848; Calder 2152.*

Hierochloë alpina (Swartz) R. & S. — Common in the drier habitats along the exposed rocky ridges, on the dry heath, and in open areas of gravel and sand. Forma **Soperi** Pol., a broad-leaved form, was collected on two occasions. *Senn & Calder 3727, 4042.*

Phippsia algida Br. (= *Catabrosa algida* (Sol.) Fries) — Occasional in moist habitats, especially along the upper, muddy or sandy margins of the beaches in the more protected coves. *Senn & Calder 3888.*

Pleuropogon Sabinei. Br. This species was only noted along the shallow-watered margin and on the muddy bank of a small freshwater pond a few miles north of the camp. *Calder 2135.*

Poa alpina L. — Represented by only two collections from the sand beaches bordering Koojesse Inlet. Apparently rare, though possibly overlooked. *Senn & Calder 3840; Calder 2211.*

***†P. arctica** Br. — Common in a wide range of moist and dry habitats and represented by about 20 collections.

***P. glauca** Vahl — Quite common in dry sandy soil in the more open communities along the upper margins of the beaches. Collected also along the face of the limestone cliff at Silliman Mountain. *Senn & Calder 3912.*

P. pratensis L. — Noted only about the old Eskimo dwelling sites (Fig. 4) along the east bank of the Sylvia Grinnell River, where it was quite common but restricted to the more nitrogenous soils. *Senn & Calder 3593, 4014.*

Puccinellia paupercula (Holm) Fernald & Weath. — Quite common in saline habitats along the lower limits of the sand beaches bordering Koojesse Inlet and Frobisher Bay.

P. phryganodes (Trinius) Scribner & Merrill — Represented by a single collection made below high-tide mark along a sand beach bordering Koojesse Inlet. *Senn & Calder 3893.*

Trisetum spicatum (L.) Richter — Common throughout the area in a wide range of habitats. Collected in moist rock crevices, late-snow patch areas, along the dry sand beaches, and about the old Eskimo house sites along the banks of the Sylvia Grinnell. A variable species with a number of named varieties and forms.

Fig. 2. Moist sedge meadow and shallow pond in the vicinity of Koojesse Inlet supporting a dense stand of *ranunculus pallasii*.

Cyperaceae

Carex aquatilis Wahl. var. **stans** (Drejer) Boott (= *C. stans* Drejer) — Quite common but apparently restricted to the margins of the numerous small freshwater ponds. Specimens transitional between this species and *C. Bigelowii* were collected by a small lake a few miles north of the base. *Calder 2136.*

C. atrofusca Schkuhr — Quite common in the more open damp situations in the sedge meadows, around the margins of freshwater ponds, and along the banks of streams.

C. Bigelowii Torrey — Common in a wide range of habitats but preferring the more sparsely populated communities on dry sand or gravel. Noted also in moist depressions along the upper margins of the beaches, and in the dry lichen-heath areas.

***C. bipartita** Bell. — Both the typical phase and var. **amphigena** (Fernald) Pol. were widespread throughout the area and are represented by a number of collections. The typical phase was quite common in the marshy meadows, around the margins of late-snow patches, and along the limestone cliff at Silliman Mountain. *Senn & Calder 3845; Calder 2040.* The halophytic var. **amphigena** was restricted to the shore lines, where it often formed extensive colonies along the sandy-muddy margins of tidal pools and along the stream banks in the more protected coves. *Senn & Calder 3858, 3958.*

C. capillaris L. — Common. Represented by a number of collections from a variety of habitats: dry tundra area on ridge north of camp, moist meadow near Eskimo dwelling site, along sandy beach, on dry gravel bank, in moist sand and moss along stream bank, etc. All the collections are referrable to the typical form.

C. chordorrhiza Ehrhart — This species was noted only once during the period of the survey. The collection was made on July 24 along the muddy margin of a small freshwater pond a few miles north of the camp. *Calder 2139.* Previously unreported for the Frobisher Bay region and representing a slight northern range extension for the Eastern Arctic.

C. holostoma Drejer — Rare. Noted only twice in the sparsely vegetated zone immediately above the sand beach in the vicinity of the camp. The first collection was made in a moist muddy depression, the second in sandy soil. *Calder 2069, 2204.*

C. maritima Gunn. — Quite common but restricted to the more open communities along the upper part of the sand beaches border-

ing Koojesse Inlet. *Senn & Calder 3738, 3849.* Previously unrecorded for the Frobisher Bay area.

C. membranacea Hooker — Common. Represented by a number of collections from a wide range of moist habitats: moist soil above beach, moist meadow near Eskimo dwelling site, edge of small stream, etc.

***C. misandra** Br. — Common in a wide range of habitats but preferring the drier situations of the lichen-heath, and exposed sandy-gravel areas.

C. nardina Fries — Common along the upper margins of the sand beaches, in the more open communities on the dry heath, and in general in open areas of gravel or sand.

C. norvegica Retz. (= *C. Halleri* Gunn.) — Quite common. The majority of our collections are from the open communities on dry sandy soil or gravel. Dwarf specimens were collected in the moist meadow about the old Eskimo dwelling sites, and on the rocky ledges along the east bank of the Sylvia Grinnell.

C. rariflora (Wahl.) Sm. — Quite common in the marshy meadows and moist habitats about the freshwater ponds about one mile west of the camp. *Senn & Calder 3881, 3884.* Both collections are referrable to forma **erecta** Pol. which has erect instead of pendulous spikelets. This species was rare elsewhere in the area.

C. rupestris Bell — Occasional in the more open communities on the dry lichen-heath, and on exposed banks of gravel and sand. *Senn & Calder 3850, 4018.*

C. salina Wahl. var. **subspathacea** (Wormsk.) Tuck. — Apparently rare. Represented by a single collection from the moist sandy edge of a tidal pool below highwater mark. *Senn & Calder 3790.*

C. saxatilis L. var. **major** Olney (= *C. physocarpa* Presl) — Apparently rare though possibly overlooked. Represented by a single collection made along the margins of freshwater pond a short distance north of the camp. *Calder 2137.* Previously unreported for the Frobisher Bay area.

C. scirpoidea Michaux — Common. Represented by a number of collections from a variety of habitats: upper part of sand beach, sandy soil below ridge, dry heath, etc.

C. supina Wahl. — Rare. Only a single colony of this species was found on an exposed dry gravel bank about three miles east of the camp. Previously unrecorded for the Frobisher Bay region, and only reported from three widely scattered localities in the Eastern Arctic. Two collections were made, one on July 15, *Calder 2042,* the other on July 26, *Calder 2190.*

C. ursina Dewey — Occasional. Represented by two collections from the beach area at base. One was made in wet muddy soil in the zone just above the high-tide level, the other around the wet sandy margins of a small saline pool. This halophytic species was restricted to the sand beaches and muddy shore lines about Koojesse Inlet. *Senn & Calder 3855; Calder 2103.*

Eleocharis acicularis (L.) R. & S. This species, growing in association with *Ranunculus hyperboreus,* was quite common about two miles north of the camp along the muddy-sandy shoreline of a small freshwater pond. *Calder 2138.* When collected on July 23 the plants were in full flower and in all probability mature seed was produced. A thorough search was made along the margins of the nearby pools and in general throughout the area, but no further colonies were noted. This collection represents a slight northern range extension for the Eastern Arctic. This species has previously been reported by Polunin (*l.c.* p. 106) from Lake Harbour in Southern Baffin Island, Cape Smith in northern Quebec, and from Chesterfield on the west coast of Hudson Bay.

Eriophorum angustifolium Honckeny. — Common in moist habitats throughout the area. Collected in a moist depression formed by late-melting snow in the tundra area just north of the camp and in a drainage ditch below the ridge a short distance east of the base.

E. callitrix Cham. — Occasional in the moist sedge meadows, and along the margins of freshwater ponds. *Senn & Calder 3853.*

E. Scheuchzeri Hoppe — This was the most common species of *Eriophorum* in the area forming extensive colonies in the wetter muddy habitats, especially about the margins of the freshwater ponds, and in moist depressions in the sedge meadows.

†E. spissum Fernald — Common in the marshy valley areas, and preferring a habitat

somewhat similar to that of *E. callitrix* with which it was often associated.

Kobresia myosuroides (Villar) Fiori & Paol. (= *K. Bellardi* (All.) Degland) — Occasional on exposed sand or gravel banks, and in the drier habitats along the rocky ridges. *Calder 2163, 2194.* Previously unrecorded for the Frobisher Bay region.

K. simpliciuscula (Wahl.) Mack. — Quite common in the drier habitats in the sedge meadows, and especially common in the open areas along the upper limits of the sandy beaches bordering Koojesse Inlet.

Juncaceae

Juncus albescens (Lange) Fernald — Occasional in moist depressions along the upper margins of the sand beaches, and in moist habitats about the numerous small freshwater ponds. *Calder 2071.*

J. biglumis L. — Common. Found in habitats similar to those of the preceeding species with which it was occasionally found in association.

J. castaneus Sm. — Quite common in moist habitats along the upper part of the beaches bordering Koojesse Inlet and around the margins of the freshwater pools and ponds.

†**Luzula confusa** Lind. — Common in a wide range of habitats. The majority of the collections were made in the open sandy areas along the upper limits of the sand beaches.

L. nivalis (Laest.) Beurling — Quite common in sandy soil along the upper margins of the sand beaches, and in the more open communities in areas of gravel and sand. Noted occasionally in moist soil in the vicinity of late-snow patches.

L. Wahlenbergii Ruprecht (= *L. spadicea* (All.) DC. var. *Wahlenbergii* (Ruprecht) Buchenau — Quite common. The majority of the collections are from the lichen-heath areas and wet sedge meadows, although occasionally the species was noted in sandy soil along the upper limits of the sand beaches. *Senn & Calder 3877, 4021.* Previously unreported for the Frobisher Bay region.

Liliaceae

Tofieldia coccinea Rich. — Rare. Noted on only one occasion on a moist south-facing slope a few miles east of the camp. A small colony of some 60 plants was found growing in association with *T. pusilla* in the grassy heath. *Calder 2033.* Previously unrecorded for southern Baffin Island, although reported by Polunin (*l.c.* p. 150) from northern Quebec, northern Baffin Island, and Devon Island.

T. pusilla (Michaux) Persoon (= *T. borealis* Wahl.) — Quite common in moist depressions in the sedge meadows and lichen-heath areas. Noted also on moist river banks, and in the grassy zone above the sand beaches.

Salicaceae

***Salix arctica** Pallas var. **Brownei** And. — An extremely common and variable species occurring in a wide range of habitats. Represented by no less than 25 collections.

†**S. arctophila** Cock. — Occasional in moist habitats. The majority of the collections were made along the rocky-gravel banks of the small streams in the vicinity of the base. *Senn 3535, 3580.*

S. calcicola Fernald & Wiegand — Quite common in moist habitats throughout the area. Collected along the upper limits of the sand-gravel beaches, and along the rocky stream banks. *Senn 3628, 3629; Calder 1982.* Previously unrecorded for the Frobisher Bay region.

S. cordifolia Pursh var. **callicarpaea** (Trautv.) Fernald — Rare. Represented by a single collection from a rocky slope a short distance east of the camp. *Calder 2054.*

S. herbacea L. — Noted in wide range of habitats. Especially common on the upper part of the sand beach at base, and in areas where there was a late-snow cover.

S. reticulata L. — Common throughout the area. Represented by numerous collections from a variety of moist and dry habitats.

***S. Richardsonii** Hooker — Represented by a single collection from along the face of the limestone cliff at Silliman Mountain. *Senn & Calder 3913.* Common locally in moist places among calcareous rocks. Previously unrecorded for the Frobisher Bay area.

S. Uva-ursi Pursh — Common in dry sandy soil along the upper part of the beach at base, and in open rocky-gravel areas, where it forms dense conspicuous mats.

Fig. 3. Aerial photograph of Silliman Mountain taken on July 1 from an altitude of about 5000'.

Betulaceae

†**Betula glandulosa** Michaux — Rather rare. Noted only on four occasions in sheltered situations along the rocky slopes. *Senn 3664; Calder 2035.* It was noted as common along the base of the high cliffs and in the sheltered valleys, in the vicinity of the Hudson Bay Post at Ward Inlet, *Freeman s.n.,* July 19, 1948. Previously unreported for the Frobisher Bay region.

Polygonaceae

Koenigia islandica L. — Occasional in the more sheltered situations on a sandy or muddy substratum along the shoreline of Koojesse Inlet. Noted also inland along the margins of a few freshwater ponds. *Senn & Calder 3896; Calder 2118.*

Oxyria digyna (L.) Hill — Common throughout the area in a wide range of habitats. Especially luxuriant when growing in moist situations along the bases of the steeper rocky slopes, and in areas of late-melting snow.

Polygonum viviparum L. — Represented by a number of collections from a variety of habitats. Although very common throughout the area, it never formed a dominant part of the vegetation.

Caryophyllaceae

*Arenaria ? **elegans** C. & S. (= *Minuartia elegans* (C. & S.) Schischkin) — A single collection made along the limestone cliff at Silliman Mountain is hesitatingly referred to this species. *Senn & Calder 3924.* Hulten[7] has pointed out that this species is closely related to *Arenaria Rossii* Br. (= *Minuartia Rossii* (Br.) Graebner) and may be merely a southern race of this species. In any event it is readily differentiated from *A. Rossii.* Polunin does not list this species for the Eastern Arctic or include it in the synonymy.

A. peploides L. var. **diffusa** Horn. — Common along the shorelines, and especially at the upper limit of the tidal zone along the sand beaches bordering Koojesse Inlet. Usually found growing in association with *Mertensia maritima* var. *tenella, Puccinellia* spp., and other halophytic plants.

A. rubella (Wahl.) Sm. — Very common in open areas of dry sand or gravel, and especially along the upper part of the sand beach in the vicinity of the camp. Forma **plena** Calder, a many-flowered proliferous form, is represented by a single collection from dry sandy ground on the rocky ridge east of the camp. *Senn & Calder 3739* (Type).

[7] Flora of Alaska. IV: 681. 1944.

A. sajanensis Willd. — Common. Collected along the gravel banks of streams, in moist sand along the upper margins of the beaches, and on the mossy bank of a sheltered slope a mile or so north of the base.

***A. uliginosa** Schleicher — Occasional. Collected on two occasions in moist sandy soil in the vicinity of the camp, and also on the limestone cliff at Silliman Mountain. *Senn & Calder 3922; Calder 2128A.* Previously unrecorded for the Frobisher Bay area.

***†Cerastium alpinum** L. — Common and occurring in a wide range of habitats. Noted especially in the more open areas of sandy soil, and along the upper part of the beaches bordering Koojesse Inlet.

Lychnis apetala L. var. **nutans** Boivin (=*L. apetala* sensu Polunin) — Common throughout the area and preferring open moist habitats. Collected on hummocks in the sedge meadows, on the moist sandy beaches, along stream courses, etc. *Senn & Calder 3746, 3868; Calder 2012, 2065* (All paratypes).

†L. triflora Br. (= *L. furcata* sensu Polunin). — Common, especially in the more open communities along the upper part of the sand beaches bordering Koojesse Inlet. Noted also about the old Eskimo dwelling sites and in crevices along the rocky bank of the Sylvia Grinnell River.

Sagina intermedia Fenzl — Quite common. All collections were made in open areas of sandy soil on the upper part of the sand beaches in the vicinity of the camp. *Senn & Calder 3891; Calder 2131.* Previously unrecorded for the Frobisher Bay region.

Silene acaulis L. var. **exscapa** (All.) DC. — Common throughout the area in a variety of habitats. The majority of the collections were made in open areas of sand or gravel and along the exposed rocky hillsides.

Stellaria ciliatosepala Trautv. (= *S. longipes* Polunin *pro parte)* — Represented by a single collection made in sandy soil in the vicinity of the camp. *Senn & Calder 3734.*

S. crassipes Hulten *(= S. longipes* Polunin *pro parte)* — Collected only once along the upper part of the sand beach near the base. *Calder & Senn 2007.*

S. humifusa Rottboell — Occasional. Restricted to the upper limits of the tidal zone in sheltered situations along the beaches about Koojesse Inlet, where it formed prostrate tangled mats on a moist silty or sandy substratum. *Senn & Calder 3779.*

S. monantha Hulten var. **typica** Boivin (= *S. longipes* sensu Polunin *pro parte)* — Represented by a single collection made near an old Eskimo dwelling site on the east bank of the Sylvia Grinnell River. *Senn & Calder 3981.*

Ranunculaceae

Ranunculus hyperboreus Rottboell — Quite common. Collected along the wet muddy shorelines of a few freshwater ponds, and along the banks of streams. *Senn & Calder 3857.*

R. lapponicus L. — Rare. Noted only twice in a moist sedge meadow between two small ponds a mile or so southwest of the base. *Senn & Calder 3873; Calder 2024.* Previously unrecorded for the Frobisher Bay area.

***R. nivalis** L. — Very common throughout the area. Collected in a wide range of moist habitats: stream banks, the foot of rocky slopes, boggy meadows, margins of snow banks, etc.

R. Pallasii Schlecht. — Restricted to the wet muddy banks and shallow-watered margins of three small freshwater ponds (Fig. 2) in a sedge meadow about one mile southwest of the base. Although the species was common locally, no other colonies were noted in the area. Flowering specimens were collected on July 6, *Senn & Calder 3765,* and fruiting specimens on July 19, *Calder 2056.* These collections represent a northern range extension of some 60 odd miles for the Eastern Arctic. This species has been collected at Lake Harbour in southern Baffin Island and at Mosquito Bay in northern Quebec.

R. pedatifidus Sm. var. **leiocarpus** (Trautv.) Fernald — Quite common in moist habitats. Represented by a number of collections from along the banks of streams, moist rocky slopes, damp open areas, etc.

R. pygmaeus Wahl. — Quite common. Collected in moist sand along the base of a steep south-facing slope, the margins of a late-snow patch, and along stream banks.

Papaveraceae

Papaver radicatum Rottboell — Very common in open exposed habitats on dry sand or gravelly soils. The majority of the collec-

Fig. 4. Old Eskimo dwelling site on east bank of Sylvia Grinnell River. Luxuriant colonies of *poa pratensis, cerastium alpinum,* and *cochlearia officinalis* may be noted in foreground.

tions were made along the upper limits of the sandy beaches bordering Koojesse Inlet.

Cruciferae

***Arabis alpina** L. — Noted only once on the bank of a small stream along the face of the limestone cliff at Silliman Mountain. *Senn & Calder 3917.*

A. arenicola (Rich.) Gelert — Quite common but restricted to open dry sandy areas along the upper part of the beaches bordering Koojesse Inlet. *Senn & Calder 3862; Calder 2016.* These collections represent the first records for the Frobisher Bay area.

***Braya purpurascens** (Br.) Bunge — Rare. Noted only at Silliman Mountain, where it was growing in rock crevices along the limestone cliff, *Senn & Calder 4020,* and on dry clay in a sparsely vegetated area by a small pond about one mile north of the camp. *Senn & Calder 3898.* Previously unreported for the Frobisher Bay region.

Cardamine bellidifolia L. — Quite common in the more open communities in gravelly or sandy soil. The majority of the collections were made in moist depressions along the upper part of the sand beaches near the camp.

C. pratensis L. — Collected in shallow water and in damp soil along the margins of a small stream that emptied into Koojesse Inlet. *Calder & Senn 2057.* Apparently rare though perhaps overlooked, as a few small sterile colonies were noted in shallow freshwater pools along the east bank of the Sylvia Grinnell River.

Cochlearia officinalis L. — Common along the sandy shoreline of Koojesse Inlet and represented in the area by var. **oblongifolia** (DC.) Gelert and var. **groenlandica** (L.) Gelert. Luxuriant colonies (Fig. 4) of the latter were found around the Eskimo dwelling sites along the bank of the Sylvia Grinnell. *Calder 2169.*

***Draba alpina** L. — Noted in a wide range of habitats and, although quite common in the area, it was never found to be locally abundant except on the limestone talus slope at Silliman Mountain. *Senn & Calder 3900.*

D. crassifolia Graham — Quite common. Polunin's remarks (l.c. p. 238) as to the habitat of this species are as follows: "Very occasional but gregarious in sheltered ravines and other "late-snow" areas . . . never found in any spot that had not a deep drift of snow covering it in winter . . .". In contrast, our seven collections were all made along the upper limits of the sand beaches bordering Koojesse Inlet. *Senn 3626, Calder 2018A.*

***D. fladnizensis** Wulfen var. **heterotricha**

(Lindblom) Ball — Quite common in the more open sandy or gravelly areas. Collected also along the face of the limestone cliff at Silliman Mountain.

*D. glabella Pursh — Common in sand or gravel, especially in the more sparsely vegetated communities. Noted also in rock crevices on the limestone cliff at Silliman Mountain.

D. nivalis Lil.—Common on dry gravel banks. and in the sparsely populated communities along the upper limits of the sand beaches. Noted occasionally in crevices on the more exposed rocky slopes.

Eutrema Edwardsii Br. — Common in a wide range of habitats though never noted as locally abundant in any one area. Collected in the lichen-heath area, along the upper limits of the sand beaches, and in the moist meadows.

Saxifragaceae

Chrysosplenium tetrandrum (Lund) Fries (= *C. alternifolium* L. var. *tetrandrum* Lund) — Noted only in two places. Quite common locally on damp clayey soil along the margins of a freshwater pond about one mile north of the camp, *Senn & Calder 3799,* and around a number of the old Eskimo dwelling sites along the east bank of the Sylvia Grinnell River. *Senn & Calder 3954.* Previously unrecorded for the Frobisher Bay region.

***Saxifraga aizoides** L. — Noted only twice in the vicinity of the base. One small colony was found in an open area on clayey soil between two small ponds a short distance north of the camp, (*Calder 2143*), the other in a moist sandy depression along the upper limits of the sand beach. *Calder 2112.* Common locally on the limestone talus slope at Silliman Mountain. *Senn & Calder 3914.*

S. caespitosa L. Common in a wide range of habitats but never noted as locally abundant. The majority of the collections were made in rocky crevices along the hillsides in the vicinity of the camp.

S. cernua L. — Common, especially in moist situations along the margins of late-melting snow patches, and in sheltered situations along the bases of the rocky slopes.

S. nivalis L. — Quite common throughout the area in moist sandy depressions and in rock crevices, but never noted as locally abundant in any one locality. *Calder 2013.*

S. oppositifolia L. — Common and noted in a wide variety of habitats. A characteristic plant of the dry rocky slopes and exposed heath-areas.

S. rivularis L. — Common in moist habitats. Noted in moist sandy depressions in the more sparsely vegetated areas, along the banks of streams, and in sheltered rock crevices. Represented by both the white-petalled form, f. **hyperborea** (Br.) Hooker *(Senn & Calder 3709)*, and the form with purple-tinged petals f. **purpurascens** Lange. *Senn & Calder 3708.*

S. stellaris L. var. **comosa** Retzius — Rare. Noted only once in a moist sedge meadow by a small freshwater pond about a mile or so north of the base. *Senn & Calder 4019.*

†**S. tricuspidata** Rottboell — Common in dry sandy soil along the beaches, in open areas of sand or gravel, and in the drier rocky situations.

Rosaceae

Dryas integrifolia Vahl — Common throughout the area especially in the drier and more exposed habitats.

Potentilla Egedii Wormskj. — Represented by three collections from along the shoreline of Koojesse Inlet. Noted occasionally around the saline margins of tidal pools, and in sandy or muddy soil along the upper limits of the tidal zone in protected coves. *Senn & Calder 3777; Calder 2101.* All the collections are referable to var. **groenlandica** (Tratt.) Pol.

P. hyparctica Malte var. **elatior** (Abromeit) Fernald (= *P. emarginata* Pursh) — Common. An extremely variable species which was noted in a wide range of habitats and is represented by twelve collections. As noted also by Polunin, this species under favourable conditions will flower for the second time during the short growing season, usually producing short-peduncled flowers hidden in the rosette of basal leaves. *Calder 2104.*

Leguminosae

Astragalus alpinus L. — Very common throughout the area in the more open situations on dry gravel or sand.

A. eucosmus Rob. — Occasional in habitats similar to those of the preceding species.

Although noted only on four or five occasions, in open areas of sand or gravel, it usually formed extensive colonies. *Senn & Calder 3751, 3867, 4033.* The habit of growth of *A. eucosmus* in the Frobisher Bay area varied quite markedly from that of colonies of this species seen farther south. The plants were essentially decumbent with the stems often creeping along the ground, while plants from the Churchill and Fort Chimo areas had an essentially upright mode of growth. Previously unreported for the Frobisher Bay region, although it has been collected about 60 miles to the south at Lake Harbour, and also in northern Quebec. The collections cited represent a slight northern range extension for the Eastern Arctic.

Oxytropis Maydelliana Trautv. — Common, especially on the dry rocky slopes and in the lichen-heath areas. Extensive colonies were also noted along the upper limits of the dry sandy beaches. When in bloom, this species was one of the most conspicuous plants in the area.

O. podocarpa A. Gray. — Although this species was collected on no less than eight occasions, it was rather rare in the area. The majority of the collections were from the more open communities and the habitats, as represented by a random selection from our field notes, are as follows: dry gravel slopes, open sand and gravel, dry hillside, gravel ridge, and dry gravel-rock plain. *Senn & Calder 3946, 3955.* This species had an extremely short flowering period, the first flowering collection being made on June 24 and the last on June 30. On July 13, when fruiting specimens were last collected, the seed was still immature. Although cited by Polunin (l.c. p. 294) as rare in the Eastern Arctic, it has probably been previously overlooked owing to its being inconspicuous in the fruiting stage.

Empetraceae

†**Empetrum nigrum** L. — Common along the rocky slopes and in the more sheltered areas on the dry lichen-heath.

Onagraceae

Epilobium latifolium L. — Common throughout the area in dry sand or gravel in the more exposed open habitats. It is one of the first invaders of cleared or broken ground, and was especially common about the base. A single colony of the white-flowered form f. **leucanthum** (Ulke) Fern. was noted along the upper limits of the sand beach near the camp. *Calder 2201.*

Haloragidaceae

Hippuris vulgaris L. — Noted only along the muddy banks of two or three freshwater ponds about one mile north of the camp. *Senn & Calder 3805.*

Pyrolaceae

Pyrola grandiflora Radius — Common in the more sheltered situations along the rocky slopes in the dry heathy areas, and in moist sandy depressions along the upper parts of the sand beaches.

Ericaceae

Arctostaphylos alpina (L.) Sprengel — Quite common on the dry rocky hillsides and heathy slopes. *Calder 2176.*

***Cassiope hypnoides** (L.) D. Don — Occasional in moist habitats. Collected along the damp mossy banks of streams and along the edge of the rocky slope southeast of the Eskimo village. *Senn & Calder 3726, 3938.*

C. tetragona (L.) D. Don — Very common throughout the area in a variety of habitats. Especially abundant on the dry heath and along the rocky slopes, where it is often the dominant form of vegetation.

Ledum palustre L. var. **decumbens** Aiton — Common in dry heathy habitats. The majority of the collections were made along the rocky slopes.

***Phyllodoce coerulea** (L.) Bab. — Noted only on four occasions, in moist depressions along the south-facing rocky slopes, and in moist habitats along the banks of small streams. *Senn & Calder 3899; Calder 2154.*

Rhododendron lapponicum (L.) Wahl. — Quite common, especially in the drier situations along the rocky ridges and in the lichen-heath area. *Senn 3544.*

Vaccinium uliginosum L. var. **alpinum** Big. — Common in a wide range of habitats, but noted as especially abundant in the more sheltered communities along the rocky slopes.

V. Vitis-Idaea L. var. **minus** Lodd. — Noted in a variety of habitats. Quite common, and at times forming extensive colonies along the margins of gravel banks.

Diapensiaceae

Diapensia lapponica L. — Common in the heath areas along the dry rocky slopes and

ridges, though rarely noted as abundant in any one community.

Plumbaginaceae

Armeria maritima (Miller) Willd. var. **sibirica** (Turcz.) Lawrence (= *A. labradorica* Wallroth *sensu* Polunin *pro parte*). — Fairly common along the upper limits of the dry sand beaches, and in open areas of sand or gravel. *Senn & Calder 3714; Calder 2014.*

Boraginaceae

Mertensia maritima (L.) S. F. Gray var. **tenella** Fries — Occasional in the sandy-gravelly areas along the lower limits of the beaches bordering Koojesse Inlet in saline habitats. *Senn & Calder 3691.*

Scrophulariaceae

Pedicularis flammea L. — Quite common. Collected in the wet sedge meadows, along the margins of a late-snow patch, in moist depressions in the heath area, and along the upper limits of the sand beaches. *Senn & Calder 3776.*

***P. hirsuta** L. — Common and represented by a number of collections from a wide range of habitats. The majority of the collections were made in the more sheltered situations along the rocky slopes, but it was also noted in the moist meadows and along the upper limits of the sand beaches.

***P. lanata** Cham. & Schl. — Collected only along the base of the limestone cliff and on the talus slope at Silliman Mountain. *Senn & Calder 3918.* It was quite common locally in this area but was not noted in the vicinity of the camp.

P. lapponica L. — Quite common. Collected in both moist and dry heathy areas along the hillsides and gentle slopes. *Senn & Calder 3808.*

Campanulaceae

Campanula uniflora L. — Never abundant although collected on a number of occasions in moist rock crevices along the bank of the Sylvia Grinnell River, on the dry lichen-heath area above the sand beaches, and along the rocky south-facing slopes. *Senn & Calder 3715; Calder 2157.*

Compositae

Antennaria angustata Greene — Quite common though never noted as locally abundant in any one area. Collected in the more sheltered habitats along the south-facing rocky slopes, along the margins of gravel banks, and in areas in which there was a late covering of snow. *Senn & Calder 3696; Calder 2046.*

A. Ekmaniana A. E. Porsild (= *A. labradorica* sensu Polunin) — Rather rare. Collected on only two occasions, once along a gravel bank about 3 miles southeast of the camp, and once in rock crevices along the east bank of the Sylvia Grinnell River. *Calder 2047, 2159.* In both cases it was found growing in association with *A. angustata.*

***Arnica alpina** (L.) Olin var. **Vahliana** Boivin (= *A. alpina* var. *angustifolia* sensu Polunin) — Occasional in sheltered situations along the south-facing rocky slopes bordering Koojesse Inlet and the Sylvia Grinnell River. Noted also in the limestone area at Silliman Mountain. *Senn & Calder 3803.*

Artemisia borealis Pallas — Common but restricted to the sand-gravel beaches bordering Koojesse Inlet. *Senn & Calder 3859.*

***Chrysanthemum integrifolium** Rich. — Collected first at Silliman Mountain where it was common on the grassy hummocks at the base of the limestone cliff. *Senn & Calder 3903.* Two small colonies were found in the vicinity of the camp, one in a moist depression between two small ponds, the other on a grassy hillside. *Calder 2037, 2142.* Polunin reports that this species "...seems to be somewhat calcicolous . . .", and this is apparently true as, in the latter two habitats, the surface of the surrounding soil was covered with a crystalline limey encrustation. Previously unrecorded for the Frobisher Bay region.

Erigeron eriocephalus Vahl — Occasional along the edge of gravel banks, and in the open grassy zone bordering the sand beaches. *Calder 2188.*

Erigeron unalaschkensis (DC.) Vierh. — Quite common on south-facing grassy slopes, along sheltered gravel banks, and in areas where there was a late snow cover. Occasionally associated with the preceding species in sheltered habitats. *Calder 2123, 2187.*

Taraxacum phymatocarpum Vahl — Occasional in the more sheltered habitats along the upper zone of the sand-gravel beaches bordering Koojesse Inlet. *Calder 2043.*

A WALRUS IN THE BAY OF FUNDY; THE FIRST RECORD[1]

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AN EVENT occurred on about April 24, 1937, on what is known as the French Shore of the Bay of Fundy coast of Nova Scotia which is unique in the history of this region and which I have not seen recorded in the literature. The incident is of such an unusual nature that it is worthy of record, and as I have recently had the opportunity of interviewing the persons concerned and inspecting the specimen I will attempt to record what happened in as great detail as possible.

On that date two Acadian fishermen, Joseph and Alphonse Saulnier of St. Alphonse, Digby County, were fishing off Bear Cove. They were surprised and startled by a great upheaval in the sea near their boat and the appearance of a large marine animal which was completely strange to them. At that time they had never heard of an animal answering its description, and they lost no time in hauling their lines and making for shore. On shore they related their experience to other fishermen and were laughed at for running away. The next day, however, the animal was reported by another boat, and the day following it was seen by several boats and considerably frightened them by coming very close and they believed it was after the fish on their lines.

By this time all the boats in the neighborhood were carrying rifles, and the Saulniers had along Alphonse's 12-gauge shotgun loaded with ball. At 5 o'clock in the morning of April 27 the Saulniers were cruising close to the cliffs near Bear Cove when they saw a large marine animal asleep on the rocks at the foot of a 75-ft. cliff. It was lying in shallow water not far from a large driftwood log caught on the rocks.

Alphonse landed to stalk the animal and Joseph took the boat to sea as he wanted no part of the animal when wounded as it had appeared formidable enough when not molested. Alphonse approached as close as he dared and shot it in the head, and after considerable thrashing about it died. He was then faced with the problem of how to remove this great mass of flesh to a point where it could be examined and identified. The driftwood log solved the problem. After recalling his partner and several other boats they managed to lash the body to the log, which floated it, and to tow both down the shore several miles to the nearest wharf where the body was hoisted out of the water by a derrick. It was there identified as a bull Atlantic walrus, *Odobenus rosmarus* (Linnaeus).

The animal was then taken to Yarmouth where an account of its capture appeared on Page 1 of the Yarmouth Light of April 29, 1937, and subsequently several other Nova Scotia newspapers. It was partially measured in the flesh by Mr. Roger Pothier, of Belleville, Yarmouth County, a taxidermist who was given the job of mounting the carcass for display. After a day or two it was brought back to the village of St. Alphonse where it was kept for a period in a garage and an attempt was made to skin it.

By this time it was smelling so badly that the owner of the garage rebelled, after an unsuccessful attempt to combat the smell with the aid of perfume from the local drugstore, and the carcass was removed to the Saulnier farm. There it was skinned out and the carcass buried, and Mr. Pothier took the skin back with him to mount. The mounted specimen was then taken on a tour of the province as an exhibit and made a fair profit for its owners. Today it is in the barn of Mr. Nicholas Comeau, of St. Alphonse, who still puts out a sign advertising its presence in the tourist season.

I have examined the mounted specimen, which is shown in the photographs, and the story has been put together from the accounts of Alphonse Saulnier, Nicholas Comeau, and Roger Pothier. The newspaper files have been checked, and Mr. Basile Belliveau, of Belliveau's Cove, has collected information for me. The following is a description of the animal put together from all the above sources:

Sex: Male, penis observed by Saulnier and Comeau, but it had been removed when the skin was turned over to the taxidermist.

[1] Received for publication August 3, 1950.

Fig. 1. A side view of the mounted specimen showing the position of the outstretched neck, and the drum-tight skin which gives the animal an unnatural appearance.

Colour: The body was completely covered with light silvery-fawn hair about ¼ in. long. This is the colour today when it is dusty and dirty from years in a barn, and is no doubt somewhat faded. The hair appears continuous over the body showing no places where it has been rubbed off, indicating that the animal was in the prime of life.

Length: Mounted specimen, nose-tail 10 ft. 4 ins.; skin was 12 ft. long when removed from the carcass.

Weight: The animal was estimated to weigh 3,000 lbs. when freshly killed by fishermen who are accustomed to weighing large tuna; the hide alone weighed 300 lbs. on the scales when removed from the carcass; 125 lbs. of fat was flensed from the hide after skinning.

The dimensions of the animal taken by the taxidermist to make the frame for the mounted specimen were:

Head and neck: Largest circumference of skull (measured from the mounted specimen) 38¼ ins. *Neck:* 2 ft. long; 17 ins. in diameter at shoulders and tapering to 11½ ins. diameter at base of skull (measured by Pothier from the dead animal.)

NOTE: In the mounted specimen the head and neck appear too small for the rest of the body. This is probably due to the fact that the measurements were taken when the animal was dead and the neck stretched out. The taxidermist had never seen the animal alive, and he assumed that this was the natural position, whereas the mounted specimen would look much more lifelike if it had been mounted with the head sunk back on the shoulders instead of extended as it is.

Circumference behind fore flippers, 8 ft. 4 ins.
Circumference 2 ft. behind shoulder, 8 ft. 4 ins.

Circumference 3½ ft. from the base of the tail, 7 ft. 6 ins.

Circumference 1 ft. from the base of the tail, 4 ft. 6 ins.

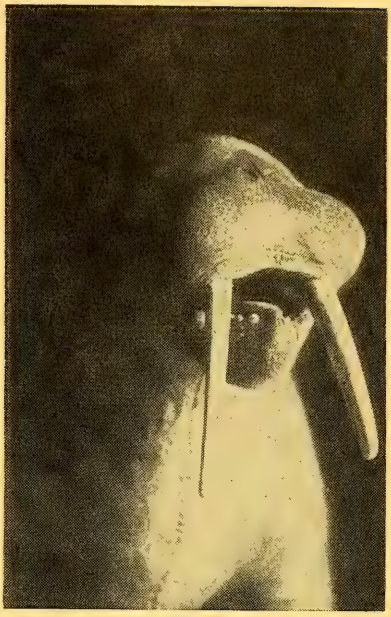
Tail: 9 ins. long, 5 ins. in circumference.

Muzzle: 9½ ins. wide; tip of nose—chin 9 ins.; eyes—tip of nose 7½ ins.

Tusks: (Measured in the mounted specimen.)
Right tusk lip-tip outside curve 9½ ins.
Left tusk lip-tip outside curve 8¼ ins. (end broken off but break old and worn smooth.)

Teeth: The skull is still in the mounted specimen but as it has been filled with plaster, as has the mouth and throat, all teeth are not in sight. However, the crowns of the molars are visible and they appear well worn indicating an adult animal, although not badly enough worn to indicate overmaturity.

The taxidermist made the mistake of fitting the skin tightly over the model constructed from these dimensions, instead of loosely as it was on the animal. When he pulled it tight the skin overlapped by about a foot, and he cut this overlap off. The result is that the mounted specimen shows no wrinkles or folds in the skin anywhere and has therefore an unnatural appearance. Considering that all he had to go by to mount the animal in a



Figs. 2 and 3. The head that rose out of the water near the Saulnier's boat. Note the teeth and the tip broken or worn off the left tusk.

lifelike pose was a line drawing of a walrus on an ice floe in a taxidermist's handbook which was printed in the early 1800's, he has done a creditable job.

The animal was very fat and apparently in in good health when shot. There are several old scars on the head and neck which the present owner thinks were made by ice, but which are probably fighting scars as would be expected in an adult male.

The Gulf of St. Lawrence and the Atlantic coast of Nova Scotia have had records of this species in early times, but this appears to be a first record from the Bay of Fundy. Even from these other areas there are very few records in recent years, although there once were breeding colonies on Sable Island, Prince Edward Island, and several places in the Gulf. Normally they are not found south of Hudson Strait today on the Atlantic coast, and the presence of an adult male over a thousand miles south and alone in April suggests that he was a "rogue male" cast out by the stronger bulls of the herd, although the complete hair covering and teeth do not suggest old age. If this is so, Alphonse Saulnier probably stalked and shot with his 12-gauge shotgun a much more dangerous animal than he knew, as a bull walrus at close quarters is an unpleasant antagonist even when living a normal family life.

Acknowledgements

My thanks are due to Mr. David R. Allen of Fredericton, N.B., who first told me about there being "a walrus in a barn in Nova Scotia", and who subsequently helped me make this investigation. Mr. Basile Belliveau of Belliveau's Cove sent me a preliminary report and gathered considerable information, and Mr. H. Dean Fisher of the St. Andrews Biological Station, St. Andrews, N.B., very kindly checked the records for me. To all three I express my appreciation.

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NOTES ON THE FOOD AND REPRODUCTION OF THE PELEE ISLAND WATER SNAKE, *NATRIX SIPEDON INSULARUM* CONANT AND CLAY [1]

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THE ISLAND WATER SNAKES of western Lake Erie have been designated as a distinct subspecies by Conant and Clay (1937). Their abundance is typified in the above report as follows: "On June 1, 1935, three collectors on Put-in-Bay Island caught 234 specimens in four hours, or an average of almost a snake a minute! In some instances as many as 12 or 14 large individuals were found hiding under a single rock!" Such abundance delights the biologist; numbers alone give a fair chance to apprise the systematist and the student of life histories a really fertile field for study. Dr. Kay Fetherston Ball collected a series of *insularum* on Pelee Island in May 1947 and from April to July, 1948. At the time, Mrs. Ball was occupied with a pheasant study. As opportunity afforded, she collected reptiles and amphibians which are now in the Cornell University collections. Robert Mengel took three specimens on August 4, 1947 that are also in the Cornell collection. This brief report is based on 35 specimens; the number is admittedly small but it does give a clue to the dietary and reproduction of the snake.

An April female showed no visible embryos. Four May females were all visibly gravid. Two specimens, with a body length of 652 mm. and 770 mm. respectively, each contained twenty-two small embryos. Another female (body length 562 mm.) carried eight embryos, averaging 35 mm. in total length. The yolks were 17 by 13 mm. A fourth (body length 571 mm.) held eleven embryos; the average total length of these embryos was 84 mm. A large female (body length 913 mm.) collected August 4, 1947 contained 26 embryos. Five of these had an average total length of 176 mm. Mr. Robert H. Mattlin collected a female at Put-in-Bay, Lake Erie. This snake had a body length of 921 mm. It was received in Ithaca on August 21, 1937. Twenty-seven young were born on September 25, a rather late date for birth in northern water snakes. The young, of undetermined sex, averaged in total lengths 227.1 mm., tail 53.2 mm. A young specimen, at least three times the bulk of the young described above, was collected in May 1948. Total length, 251 mm., tail 56 mm. This individual is presumed to be a young of the past year. We took a large snake, *Natrix sipedon sipedon,* at Ithaca, New York, on September 23, 1948 which contained twenty-three young. The young averaged 227.1 mm. in total length, with an average tail length of 55.4 mm.

Those considered sexually mature ranged in total length from 793 mm. to 1151 mm. Perfect specimens give the following ratio of tail to total length: 12 males, 23.4; 6 females, 21.1. Twenty-seven males and eight females are represented in the collection.

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[1] Received for publication February 23, 1950.

Table 1. Food of 23 *Natrix sipedon insularum* from Pelee Island, April to July, 1948.

Food	Percent Frequency of Occurrence	Percent by Bulk
Fish	56.5	53.9
Percina	22.3	18.7
Cyprinids	13.0	9.1
Ameiurids	8.7	8.7
Cottus	4.4	4.4
Undetermined fish	13.0	13.0
Amphibia	52.2	46.1
Rana pipiens	17.4	17.4
Undetermined *Rana*	11.3	11.3
Rana clamitans	4.4	4.4
Necturus	4.4	4.4
Bufo sp.	4.4	4.4
Triturus	4.4	4.4

SIXTH CENSUS OF NON-PASSERINE BIRDS IN THE BIRD SANCTUARIES OF THE NORTH SHORE OF THE GULF OF ST. LAWRENCE [1]

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TOTAL POPULATIONS of all species of non-passerine birds included in the sixth census of the sanctuaries of the north shore of the Gulf of St. Lawrence show substantial variations in number from those of 1945. The cold, wet spring of 1950 appears to have affected the distribution and numbers of nesting eiders and may have influenced their nesting success. The late start in taking the census in the sanctuaries was offset largely by the late nesting season for all species of birds in the sanctuaries, but may have affected the counting of nesting eiders, black-backed gulls and herring gulls.

The difference in techniques of the men taking the census of the bird populations in 1945 and in 1950 also may account for discrepancies in totals. Such differences were kept to a minimum by following identical procedures in counting adults, eggs and nests, but some discrepancies are unavoidable. It is felt, however, that because of similar procedures and because of the relatively small populations in each sanctuary, the differences were not significant enough to result in any erroneous indication of population trends.

On Carrousel Island Bird Sanctuary, near Seven Islands, there was a general decline from the 1945 census in numbers of all species recorded, with the exception of the black guillemot.

Engine and boat repairs delayed one month the census of the remaining sanctuaries. On Birch Islands Bird Sanctuary the bird populations were about the same as that of 1945, with slight increases in the numbers of eiders and herring gulls and a great increase in the numbers of common terns, the latter being a reflection of the shifting nesting habits of the species.

Betchouane Bird Sanctuary, twenty miles east of Havre St. Pierre, was found to be supporting, in comparison with 1945, fewer terns and ring-billed gulls, about the same numbers of puffins, auks and spotted sand-

[1] Received for publication November 25, 1950.

TABLE 1

CENSUS OF NON-PASSERINE BIRDS IN THE BIRD SANCTUARIES OF THE NORTH SHORE OF THE GULF OF ST. LAWRENCE

1945-1950

Species	Carrousel Island		Birch Islands		Betchouane		Watshishu		Fog Island		Wolf Bay		St. Mary Islands		Mecatina		St. Augustine		Bradore Bay		Totals	
	1945	1950	1945	1950	1945	1950	1945	1950	1945	1950	1945	1950	1945	1950	1945	1950	1945	1950	1945	1950	1945	1950
Red-throated loon									20	28	10	10	16	20	30	30	18	16			94	104
European cormorant													360	490							360	490
Double-crested cormorant	310	164					70	104	42		340	164	6		16						784	432
Black duck							2	10	6	6				2			4	4			12	22
Pintail									4	6				2							4	8
Green-winged teal									3	4			2	2							10	6
American eider	250	78	1508	1688	1188	1562	1184	1564	664	600	1400	720	1420	600	1640	750	1050	1100			10304	8662
Red-breasted merganser							6	4	3	2	16						12	6			42	12
Willow ptarmigan									2												2	—
Semipalmated plover								2		10			4	2	6	4			6	12	16	30
Spotted sandpiper	6	2	14	12	14	14	18	12	4	30	8	6	18	12	16	14		16	32	12	130	130
Great black-backed gull	2	2	24	10	20	104	156	114	196	124	152	228	270	106	280	150	320	160			1420	998
Herring gull	1100	800	544	634	388	492	208	158	120	124	520	396	750	670	882	548	890	860			5402	4682
Ring-billed gull					275	150			110						50	50	400				835	200
Kittiwake	750	600			27	76															777	676
Common and Arctic terns			2	250	290	62	410	420	42	54	6	8	8		18						776	794
Caspian tern									90												90	—
Razor-billed auk	60	38			250	280	32	30	24	22	2600	2200	4058	3800	158	144	8		1500	1760	8690	8274
Common murre									2000	2400	2000	2180	5248	6862					120	180	9368	11622
Brunnich's murre													2	2							2	2
Black guillemot	98	148	14	44			30	32	136	108	16	6	222	326	840	600	168	182			1524	1446
Puffin					610	662					6300	5600	4796	5400					48304	48622	60010	60284
Totals —	2576	1832	2106	2638	3062	3402	2116	2450	3476	3518	13368	11518	17180	18296	3936	2290	2870	2344	49962	50586	100652	98874

pipers and significantly greater numbers of eiders, black-backed gulls, herring gulls and kittiwakes.

The census of Watshishu Bird Sanctuary, east of Baie Johan Beetz, showed a substantial increase in the numbers of eiders and double-crested cormorants, but fewer black-backed gulls and herring gulls. Terns, auks and guillemots remained the same in numbers.

Population shifts were observed to have occurred on Fog Island Bird Sanctuary, near Romaine. No individuals of Caspian terns, ring-billed gulls or double-crested cormorants were nesting in the sanctuary. The food of these birds, consisting of small fish known locally as bait, shifted in distribution from the sanctuary to the west, and the birds appeared to have followed their food supply, as they were nesting on islands closer to it. American eiders were reduced slightly in number, as were black-backed gulls and black guillemots. Increases were noted in numbers of Atlantic murres and red-throated loons. It was gratifying to note evidences of nesting black ducks, pintails and green-winged teal.

Wolf Bay Bird Sanctuary was partially blocked by spring ice, which forced many eiders to search elsewhere for suitable nesting sites. Double-crested cormorants, herring gulls, razor-billed auks and puffins were also down in numbers in varying proportions. The Atlantic murre and the black-backed gull showed slight increases.

The census of St. Mary Islands Sanctuary revealed again that eider ducks had been influenced by temporary adverse nesting conditions, as less than one-half of last year's population was present. Other species found to be fewer in number were black-backed gulls, herring gulls, puffins, and perhaps razor-billed auks, but in the latter three cases the differences between the figures of 1945 and those of 1950 may be due to the different techniques of the census takers. A pair of Brunnich's murres was observed nesting on St. Mary Islands again this year.

Black guillemots showed a definite increase, as did European cormorants and red-throated loons. The sanctuary caretaker reported that a pair of pintails nested, the female successfully hatching her brood. The brood and adult were not seen by the writer, however, possibly because of mortality of the young.

The eider population on Mecatina Bird Sanctuary was also reduced. The steady decline in numbers of black-backed gulls appears to be continuing, along with a drop in numbers of black guillemots and herring gulls. Ring-billed gulls were as numerous as in 1945.

The St. Augustine Bird Sanctuary eider population was similar to that of 1945. No semipalmated plover were noted and black-backed gulls were reduced in numbers by about one-half, while the numbers of herring gulls and black guillemots remained the same.

On the tenth sanctuary, Bradore Bay, auks and Atlantic murres had increased in numbers, with puffins in the colonies on Greenly and Perroquet Islands being as numerous as in 1945.

In summary, the species showing population increases in the 1950 census include the red-throated loon, semipalmated plover, Euro-

pean cormorant and Atlantic murre. Population decreases were noted for double-crested cormorant, American eider, spotted sandpiper, great black-backed gull, herring gull, ring-billed gull, kittiwake, razor-billed auk and guillemot. Puffins and terns remained about the same in numbers as in 1945.

CHRISTMAS BIRD CENSUS — 1950[1]

IN response to several enquiries, we wish to state that the continued publication of the Christmas Bird Census reports in the *Canadian Field-Naturalist* has been judged by Council, of the Ottawa Field-Naturalists' Club, to be well worthwhile although some of them are also published elsewhere. We feel that many readers will appreciate the convenience of reports from across Canada being brought together in this way. Incidentally, a glance at the first and last reports show that coverage this year is truly "across Canada", although that from the maritime and prairie provinces is far from complete. The question of vernacular names has caused considerable difficulty in the editing of a few reports. In general we have tried to follow A.O.U. names, but have followed the principle suggested in *Audubon Field Notes* of applying only specific, rather than subspecific, epithets. Thus, Red-shafted Flicker includes both *Colaptes cafer cafer* and *C. cafer collaris*. The danger of using subspecific names, especially in winter, is well illustrated by the American Robin. Many of us in eastern Canada assume that any robin seen must be the Eastern Robin; yet it is now known that the Black-backed Robin breeds extensively in the Ungava Peninsula, and it may well be found across southern Quebec and eastern Ontario in fall, winter and spring. Many reports came in this year in excellent shape, but several, owing to single-spacing, change of order, name variants, etc., had to be completely rewritten before they could be typed for the printer. We hope that contributors will follow the set-up of recent reports as closely as possible. If all were submitted in as good form as the best it would save at least thirty hours of editing and typing. —D.B.O.S.

St. John's, Nfld. — (Area around Murray's Pond, Bauline Line and Torbay; coniferous forest 50%, cultivated lands 30%, sea-shore 20%). — Dec. 26, 1950; 11.00 a.m. to 4.30 p.m.; temp. 35°F.; NW wind 15 m.p.h.; cloudy and occasional snow flurries; snow on ground and lakes partly frozen over; 5 observers in one party; Total miles, 18 (3 on foot, 15 by car). — Old squaw, 11; Eider Duck, 150; Iceland Gull, 2; Great Black-backed Gull, 2; Herring Gull, 5; Kittiwake, 1; Dovekie, 2; Black Guillemot, 7; Yellow-shafted Flicker, 1; Raven, 4; American Crow, 11; Brown-capped Chickadee, 5; Golden-crowned Kinglet, 2; English Sparrow, 140; Pine Grosbeak, 3; Snow Bunting, 21. Total, 16 species; 367 individuals. — Mrs. Ambrose Gosling, Mr. and Mrs. Philip Rendell, L. M. Tuck, H. H. Winter, (Newfoundland Natural History Society).

Quebec, Que. — (Quebec city, Plains of Abraham to Sillery, Bois Gomin Road, Ste. Foy and Quebec bridge area, Quebec Zoological Garden and Charlesbourg; town suburbs 16%, fields 17%, coniferous forests 8%, deciduous woods 12%, mixed woodlots 31%, shores 16%). — Dec. 29, 1950; 7:00 a.m. to 4:30 p.m.; temp. 5°F. to 30°F.; wind 1-3 m.p.h. NW; cloudy; 5-10 inches of snow on ground; small rivers frozen; moving ice on St. Lawrence; 8 observers in 4 parties; total hours, 29 (on foot); total miles, 24 (on foot). — Ring-necked Pheasant, 2; Ruffed Grouse, 4; Herring Gull, 29; Iceland Gull, 3; Hairy Woodpecker, 5; Downy Woodpecker, 4; Blue Jay, 2; American Crow, 4; Black-capped Chickadee, 45; Red-breasted Nuthatch, 5; Common Starling, 49; English Sparrow, 244; Robin, 2; Common Redpoll, 41; White-winged Crossbill, 5; Pine Siskin, 8; American Goldfinch, 2. Total, 17 species; 454 individuals. (Seen in area: Dec. 20, Snowy Owl, 1; Dec. 24, Cedar Waxwing, 5; Dec. 17, Tree Sparrow, 3; Dec. 30, Evening Grosbeak, 1). — Louis-A. Lord, Gilbert and Jean Lord, Francois Hamel, Henri Talbot, Gaston and Ronald Lepage, Raymond Cayouette (La Société Zoologique de Québec).

Montreal, Que. — (Mount Royal, Ville LaSalle, Ahuntsic, Cote St. Luc, Montreal West, St. Helen's Island, Nuns' Island, South shore

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St. Lawrence River from Mercier Bridge to Jacques Cartier Bridge and north shore from Dorval to Victoria Bridge. — Dec. 23, 1950; overcast; wind NNE, 0 to 10 m.p.h.; temp. at 8 a.m. 17.5°F., at 4 p.m. 18°F.; depth of snow in open country 9 to 10 inches; 27 observers in 9 parties; total hours, 38; total miles, 97 (38 on foot, 3 by boat, 56 by car). — Mallard, 7; Black Duck, 349; American Pintail, 3; American Golden-eye, 854 (part. est.); Hooded Merganser, 1; American Merganser, 189; American Rough-legged Hawk, 1; Sparrow Hawk, 1; Ruffed Grouse, 1; Ring-necked Pheasant, 72; Glaucous Gull, 1; Iceland Gull, 1 (Longley, Normandin); Great Black-backed Gull, 30; Herring Gull, 593 (part. est.); Ring-Billed Gull, 1 (Longley); Rock Dove, 67 (not fully est.); Horned Owl, 2; Snowy Owl, 6; Barred Owl, 1; Short-eared Owl, 1; Yellow-shafted Flicker, 3; Hairy Woodpecker, 5; Downy Woodpecker, 24; American Crow, 18; Black-capped Chickadee, 13; White-breasted Nuthatch, 6; Brown Creeper, 15; Winter Wren, 1; American Robin, 5; Hermit Thrush, 1; Cedar Waxwing, 75; Common Starling, 449 (not fully est.); English Sparrow, 468 (not fully est.); Purple Finch, 45; Common Redpoll, 15; Pine Siskin, 14; American Goldfinch, 38; Red Crossbill, 1; Slate-coloured Junco, 1; Song Sparrow, 6; Snow Bunting, 135. Total, 41 species; approx. 3519 individuals. — J. D. Cleghorn, Mr. and Mrs. D. G. Elliot, Rev. Brother V. Gaboriault, Miss M. Glynn, D. Garneau, Miss G. Hibbard, H. A. C. Jackson, Miss D. Jackson, Rev. Brother H. Latendresse, L. Lemieux, H. Longley, Rev. Brother Matthias, W. M. McBride, I. McLaren, G. H. Montgomery, J. Normandin, W. H. Rawlings, Mrs. P. Roberts, D. Ryan, Dr. D. M. Scott, C. H. Sullivan, Mr. and Mrs. L. M. Terrill, Dr. F. R. Terroux, D. Terroux, Miss W. Wilson.

Hudson Heights, Hudson and Como, Que. — (Same area as in 1949 but not so fully covered. It should be noted this area now includes both the Whitlock Bird Sanctuary and the new Pine Lake Sanctuary). — Dec. 31, 1950; 10:00 a.m. to 4:30 p.m.; temp. about 20°F.; wind light; overcast, dull, visibility poor, ground covered, where undrifted, with 12 inches snow; streams open; Lake of Two Mountains frozen; 11 observers in 6 parties; total hours, 17 (on foot or skis); total miles 21 (on foot or skis). — Ruffed Grouse, 3; Hungarian Partridge, 16 in one covey; Pileated Woodpecker, 3; Hairy Woodpecker, 9; Downy Woodpecker, 12; Blue Jay, 38; Black-capped Chickadee, 64; White-breasted Nuthatch, 7; Brown Creeper, 2; Winter Wren, 1; Robin, 4; Cedar Waxwing, 15; Common Starling, 1; English Sparrow, 25; Pine Grosbeak, 14; Redpoll, 18, (one flock); Pine Siskin, 8; Slate-coloured Junco, 1; Tree Sparrow, 1. Total, 19 species; 242 individuals. — Pat. Baird, Audry Bryan, Vi. Bryan, Ed. Croll, Eunice Croll, John Legate, Althea Macaulay, Dunbar Mullan, Cecil Nelson, Mrs. Geo. Riley, Mac. Yuile. (Report compiled by Geof. Ommanney).

Ottawa, Ont. — Dec. 31, 1950; 8:00 a.m. to 4:30 p.m.; temp. 24°F. to 30°F.; light airs to gentle NW breeze; overcast with gentle snow to 10:00 a.m. then clear; 8 in. snow lying; rivers frozen except at and near rapids, following severe cold early in week; 27 observers in 12 parties; total hours, 61; total miles, 238.5 (75.5 on foot, 163 by car). — Black Duck, 1; American Golden-eye, 182; American Merganser, 55; Red-breasted Merganser, 1; Sparrow Hawk, 3; Ruffed Grouse, 22; Hungarian Partridge, 10; Ring-necked Pheasant, 14; Rock Dove, 173; Great Horned Owl, 1; Hairy Woodpecker, 7; Downy Woodpecker, 20; Blue Jay, 21; American Crow, 12; Black-capped Chickadee, 128; White-breasted Nuthatch, 27; Red-breasted Nuthatch, 17; Brown Creeper, 12; Winter Wren, 1; Cedar Waxwing, 2; Common Starling, 1885; English Sparrow, 1942; Eastern Meadowlark, 1 (at large manure pile; 3 at same site next day — C. F.); Purple Finch, 7; Pine Grosbeak, 2; Common Redpoll, 40; Pine Siskin, 51; American Goldfinch, 35; Red Crossbill, 20; White-winged Crossbill, 49; Tree Sparrow, 14; Song Sparrow, 4; Snow Bunting, 300. Total, 33 species; 4159 individuals. — A. E. Bourguignon, K. Bowles, A. Brown, F. G. Cooch, H. Cowan, B. A. Fauvel, Miss M. Flynn, Dr. and Mrs. C. Frankton, R. Frith, C. R. Lewis, H. F. Lewis, H. Lloyd, D. A. MacLulich, Mr. and Mrs. H. Marshall, Miss K. McElroy, L. McKinnon, T. F. T. Morland, Dr. and Mrs. L. S. Russell, Miss B. Salter, Dr. and Mrs. D. B. O. Savile, V. E. F. Solman, Miss M. Stuart, J. S. Tener.

Pakenham, Lanark Co., Ont.—Dec. 30, 1950; 8:15 a.m. to 5:00 p.m.; (temp. 15°F. at start, maximum 25°F.) no wind; overcast; 7 inches snow; audibility excellent, visibility fair; 6 observers in 3 parties; total miles 33 (19 on foot, 14 by car). — Ruffed Grouse, 2; Rock Dove, 16; Pileated Woodpecker, 3; Hairy Woodpecker, 1; Downy Woodpecker, 3; Blue Jay, 9; Black-capped Chickadee, 9; White-

breasted Nuthatch, 9; Red-breasted Nuthatch, 16; Brown Creeper, 11; Golden-crowned Kinglet, 2; Common Starling, 44; English Sparrow, 33; Common Redpoll, 80; Pine Siskin, 23; White-winged Crossbill, 34; Snow Bunting, 117. Total, 17 species, 412 individuals. (Seen during period: Dec. 10, Arctic Three-toed Woodpecker, 1; Dec. 26, Tree Sparrow, 2; Dec. 27, Red Crossbill).—Edna G. Ross, Verna M. Ross, Douglas Deugo, Bill McKenzie, R. M. McKenzie, T. W. Ross.

Kingston, Ont. — (Selected areas within a 15-mile radius of MacDonald Park; farmland 43%, woodland 8%, marsh 2.6%, towns 0.4% and water 46%). Dec. 26, 1950; 9:00 a.m. to 4:30 p.m.; average temp. 0°F.; few scattered clouds; heavy mist over open water interfered with observations; marshes and smaller bays of Lake Ontario frozen; 9 observers in 2 parties. Total hours, 11; total miles, 45 (5 on foot, 40 by car).—Common Loon, 2; Pied-billed Grebe, 1; Black Duck, 119; Greater Scaup, 11; American Goldeneye, 62; American Merganser, 1; Red-breasted Merganser, 1; Goshawk, 1; Sharp-shinned Hawk, 1; Ruffed Grouse, 15; Hungarian Partridge, 6; Great Black-backed Gull, 40; Herring Gull, 250; Ring-billed Gull, 150; Great Horned Owl, 1; Hairy Woodpecker, 1; Downy Woodpecker, 10; Blue Jay, 20; American Crow, 1; Black-capped Chickadee, 58; White-breasted Nuthatch, 9; Brown Creeper, 2; Common Starling, 150; English Sparrow, 280; Eastern Meadowlark, 1; Purple Finch, 85; Redpoll, 1; Pine Siskin, 126; American Goldfinch, 9; White-winged Crossbill, 14; Slate-coloured Junco, 13; Tree Sparrow, 113; Song Sparrow, 1; Lapland Longspur, 12; Snow Bunting, 625. Total, 35 species, 2192 (plus) individuals. (Seen in area: Bald Eagle 1, American Sparrow Hawk 2). — Arthur S. Bell, Mr. and Mrs. T. Boardman, John Cartwright, Walter C. Lamb, Austin W. Peters, Stuart Peters, Rob. E. Stewart, Geo. M. Stirrett (Kingston Nature Club).

Rutherglen, Ont. — (From township of West Ferris, city of North Bay, townships of East Ferris, Bonfield, Calvin, villages of Bonfield, Rutherglen, Eau Claire, area around Pimisi Bay, Mattawa and Kaipuskong Rivers, Kennedy and Smith's Lakes, Amable du Fond River, to 10 miles west of Mattawa, Ont.; open farmland 30%, coniferous woodlots and black spruce bog 10%, second growth mixed forest 50%, lakes and rivers 10%, settlements 10%). — Dec. 27, 1950; 8.00 a.m. to 4:30 p.m.; 38 to 23°F.; wind W, SE, SW, 2-15 m.p.h.; clear to snowflurries; ground covered with 14 inches powdery snow; all fresh water except rapids frozen; total hours 8½; total miles 72 (5 on foot, 67 by car). — American Goldeneye, 7; Ruffed Grouse, 1; Hairy Woodpecker, 7; Blue Jay, 7; Black-capped Chickadee, 49; Red-breasted Nuthatch, 4; Brown Creeper, 4; English Sparrow, 20; Pine Siskin, 2; Red Crossbill, 17; White-winged Crossbill, 1; Snow Bunting, 2. Total species, 12, about 121 individuals. (Seen in area Dec. 29: Evening Grosbeak, 19; Eastern Purple Finch, 2; Common Redpoll, 8; American Goldfinch, 7). — Louise de Kiriline Lawrence, Hazel Petty.

Huntsville, Ont. — (75% mixed forest, balance farming country and spruce-tamarac swamp). — Dec. 17, 1950; 1:00 p.m. to 4:00 p.m.; max. temp. 31°F., min. temp. 26°F.; cloudy; intermittent snowflurries; 8 to 10 inches of snow; all ponds and smaller lakes frozen; 12 observers in 4 parties; total miles 90 (10 on foot, 80 by car). — Ruffed Grouse, 14; Pileated Woodpecker, 1; Hairy Woodpecker, 7; Downy Woodpecker, 4; Blue Jay, 7; Black-capped Chickadee, 20; Brown Creeper, 2; Common Starling, 60; English Sparrow, 1; Pine Siskin, 10; White-winged Crossbill, 4. Total, 11 species, 130 individuals. (Seen in area during Dec.: American Merganser, Herring Gull, Barred Owl, Arctic Three-toed Woodpecker, Golden-crowned Kinglet, Evening Grosbeak, Redpoll, American Goldfinch, Snow Bunting). — T. Jensen, C. Kay, Mrs. C. Linklater, E. McDonald, A. May, R. May, W. Nickalls, K. Perrin, G. Phippen, R. Rutter, J. Walter, M. Walter (The Huntsville Nature Club).

Toronto, Ont. — Dec. 24, 1950; 7:30 a.m. to 5:00 p.m.; mostly dull and cool, some blowing snow from the northwest after noon in the outlying districts; wind SW 15 to 19 m.p.h., veering to NW 22 to 29 m.p.h.; temp. 40°F. to 18°F.; ground bare in city, sprinkling of snow on ground in the outskirts, 2 inches or more in the woods; bay, lake and Humber River, Bloor St. to Lambton, open, Don River open only in spots, other ponds, lagoons and rivers ice-covered; 79 observers in 20 parties; total hours, 109. — Mallard, 497; Black Duck, 1,427; Pintail, 2; Greater Scaup, 2,875; American Golden-eye, 525; Buffle-head, 58; Old squaw, 68; Ruddy Duck, 1; Hooded Merganser, 2; American Merganser, 54; Red-breasted Merganser, 5; Sharp-shinned Hawk, 2; Cooper's

Hawk, 2; Red-tailed Hawk, 12; Rough-legged Hawk, 2; Sparrow Hawk, 21; Ruffed Grouse, 16; Ring-necked Pheasant, 170; Coot, 2; Killdeer, 1 (126th species for the 26 consecutive Brodie Club's Toronto-region Christmas censuses); Glaucous Gull, 1; Iceland Gull, 1; Great Black-backed Gull, 40; Herring Gull, 5,730; Ring-billed Gull, 102; Mourning Dove, 56; Screech Owl, 2; Horned Owl, 10; Snowy Owl, 2; Long-eared Owl, 9; Saw-whet Owl, 1; Kingfisher, 10; Yellow-shafted Flicker, 1; Pileated Woodpecker, 1; Hairy Woodpecker, 24; Downy Woodpecker, 96; Arctic Three-toed Woodpecker, 2; Blue Jay, 101; Crow, 14; Black-capped Chickadee, 277; White-breasted Nuthatch, 20; Red-breasted Nuthatch, 5; Brown Creeper, 57; Winter Wren, 15; Carolina Wren, 3; American Robin, 3; Hermit Thrush, 1; Blue-bird, 4 (127 species for the Toronto Christmas-census list); Golden-crowned Kinglet, 72; Cedar Waxwing, 5; Common Starling, 3,264; English Sparrow, 1,160; Red-winged Blackbird, 2; Cardinal, 66; Purple Finch, 269; Common Redpoll, 12; Pine Siskin, 277; American Goldfinch, 197; Red Crossbill, 8; Eastern Towhee, 4; Slate-coloured Junco, 457; Oregon Junco, 1; Tree Sparrow, 277; White-throated Sparrow, 8; Song Sparrow, 67; Lapland Longspur, 10; Snow Bunting, 728. Total, 67 species, 19,164 individuals. — J. L. Baillie (as last year, compiler), J. H. Barnett, D. Beacham, O. D. Boggs, A. Buckle, A. Bunker, D. Burton, L. Butcher, G. Clark, C. H. D. Clarke, A. Cringan, C. Davies, Mrs. C. Davies, A. Dawe, M. E. Devitt, O. E. Devitt, F. H. Emery, B. Foster, C. D. Fowle, G. Francis, A. Ghent, M. Ghent, W. Giles, C. Goodwin, W. Gunn, W. W. H. Gunn, P. Harrington, C. Helleiner, F. Helleiner, W. Hiscock, C. E. Hope, R. James, F. Keim, G. Lambert, A. Lamsa, C. Leavens, J. Livingston, H. G. Lumsden, N. Martin, Norma Martin, K. Mayall, W. Millen, D. S. Miller, A. J. Mitchener, C. Molony, F. Mueller, A. A. Outram, L. Paterson, D. Perks, A. Reid, R. Ritchie, J. B. C. Runnings, J. H. Runnings, T. Russell, J. Satterly, R. M. Saunders, D. Scovell, R. Scovell, J. Sherrin, L. Sisman, T. M. Shortt, D. Smith, F. Smith, W. W. Smith, J. Speakman, D. H. Speirs, J. M. Speirs, A. Strong, D. Sumner, T. Swift, E. Talvila, R. Tasker, A. Telfer, S. L. Thompson, E. Thorn, L. Walden, J. B. Walty, C. Watson, D. West (Brodie Club and co-operators).

Hamilton, Ont. — (Dundas Valley west to Ancaster, Hamilton and harbour, Burlington Beach, Aldershot, Lake Medad, Bronte; farmland 18%, city and suburbs 10%, mixed woods with much edge, mostly on ravines and water banks 62%, lake and bay 8%, cattail marsh 2%). — Dec. 26, 1950; 7:30 a.m. to 5:00 p.m.; temp. 6°F. to 21°F., wind N to SW 5-20 m.p.h.; cloudy in a.m., clear in p.m.; 1 to 3 in. snow on ground; harbour partly open; 52 observers in 22 parties; total party-hours 134 (130 on foot, 4 by car); total party-miles 302 (229 on foot, 73 by car). — Horned Grebe, 2; Great Blue Heron, 2; Mallard, 98; Black Duck, 172; Canvas-back, 3; Greater Scaup, 142; Lesser Scaup, 1; American Golden-eye, 182; Buffle-head, 6; Old-squaw, 5; King Eider, 2 (J.B., J.C., W.G., G.N.); Surf Scoter, 1 (D.B.); Ruddy Duck, 4 (G.N.); Hooded Merganser, 2; American Merganser, 1,240; Red-breasted Merganser, 8; Cooper's Hawk, 3; Red-tailed Hawk, 12; Rough-legged Hawk, 1; Bald Eagle, 2; Marsh Hawk, 3; Sparrow Hawk, 10; Ruffed Grouse, 13; Ring-necked Pheasant, 18; Glaucous Gull, 4; Iceland Gull (Kumlien's), 1 (ad.—G.N.); Great Black-backed Gull, 34; Herring Gull, 2,750; Ring-billed Gull, 30; Screech Owl, 3; Horned Owl, 12; Snowy Owl, 2; Long-eared Owl, 3; Short-eared Owl (?), 1; Saw-whet Owl, 1 (B.F.); Belted Kingfisher, 3; Yellow-shafted Flicker, 14; Hairy Woodpecker, 19; Downy Woodpecker, 100; Blue Jay, 93; American Crow, 8; Black-capped Chickadee, 310; White-breasted Nuthatch, 42; Red-breasted Nuthatch, 2; Brown Creeper, 35; Winter Wren, 15; American Robin, 6; Hermit Thrush, 1; Golden-crowned Kinglet, 20; American Pipit, 1 (J.B., W.G., F.H.); Cedar Waxwing, 68; Northern Shrike, 1; Common Starling, 3,075; Myrtle Warbler, 1 (J.D., B.F.); Common Yellowthroat (?), 1; English Sparrow, 1,482; Eastern Meadowlark, 1; Purple Grackle, 1; Cardinal, 88; Purple Finch, 73; Pine Siskin, 43; American Goldfinch, 83; Red Crossbill, 20 (F.B., H.K.); White-winged Crossbill, 1; Slate-colored Junco, 636; American Tree Sparrow, 695; White-throated Sparrow, 1; Swamp Sparrow, 2; Song Sparrow, 37; Snow Bunting, 75. Total, 69 species; about 11,834 individuals. (Seen in area Dec. 25, Bonaparte's Gull, 6; Dec. 28, Arctic Three-toed Woodpecker, 1; Dec. 31, Catbird, 1; Eastern Towhee, 1; Jan. 5, Cowbird, 27; Jan. 7, Pileated Woodpecker, 1; Yellow-bellied Sapsucker, 1).—Dean Axelson, Florence Baillie, James L. Baillie, W. E. Benner, Donald Bourne, Neil Bourne, R. D. F. and Mrs. Bourne, F. W. Buckle, Don Bucknall, Albert N. Butwick, David Campbell, Jack

Campbell, William Campbell, K. J. Cox, John and Helen Crosby, James Dowell, Robert O. Elstone, Bob Finlayson, William W. H. Gunn, Ian Halladay, Fred Helleiner, Dr. Peter F. Henderson, Dorothy Henwood, George Holland, Roger Jackson, H. E. Kettle, Margaret Lamb, J. A. Mannheimer, Jack Martin, Dr. G. O. McMillan, John Moule, Albert B. Nind, George W. North (Compiler), James Nuttall, Florence Peart, R. K. Sargeant, Wm. Sargeant, Doug. Smith, Lawrie Smith, Tom Smith, Laura Stewart, Alden Strong, Gordon Sweatman, Ann Watson, Mabel Watson, Mrs. M. R. Watters, J. Harvey Williams, Laurel Williams, Robert Wilson, E. Woods (Hamilton Nature Club).

Galt, Ont. — Dec. 26, 1950; temp. 0°F.; clear; windy; 2 observers, 1 party; total miles, 3 on foot. — Black Duck, 56; American Merganser, 11; Ruffed Grouse, 1; Ring-necked Pheasant, 5; Herring Gull, 6; Black-capped Chickadee, 14; Brown Creeper, 1; Common Starling, 8; English Sparrow, 40; Junco, 5; Cardinal, 2. Total, 11 species; 149 individuals. — Margaret Stuart, Mary Stuart.

Kitchener-Waterloo, Ont. — (Within 8-mile radius, mostly to south; 55% deciduous woods, 14% coniferous woods, 12% open water, 7% farm lands and pasture, 12% swamp). — Dec. 23, 1950; temp. 30°F.-40°F.; wind SW 15 m.p.h.; cloudy; observers, 18; total hours, 18; total miles, 18 on foot. — Mallard, 2; Black Duck, 23; American Golden-eye, 38; American Merganser, 38; Belted Kingfisher, 1; Sharp-shinned Hawk, 1; Ring-necked Pheasant, 5; Ruffed Grouse, 6; Herring Gull, 88; Ring-billed Gull, 48; Rock Dove, 40; Great Horned Owl, 3; Screech Owl, 1; Hairy Woodpecker, 1; Downy Woodpecker, 13; Blue Jay, 36; Black-capped Chickadee, 90; White-breasted Nuthatch, 7; Red-breasted Nuthatch, 2; Brown Creeper, 20; Winter Wren, 3; Golden-crowned Kinglet, 24; Cedar Waxwing, 10; Common Starling, 50 (plus); English Sparrow, 300 (plus); Cardinal, 39; Purple Finch, 21; Common Redpoll, 25; Pine Siskin, 123; American Goldfinch, 13; Red Crossbill, 27; Slate-coloured Junco, 45; Tree Sparrow, 19; Lincoln's Sparrow, 1; Song Sparrow, 1; Snow Bunting, 160. Total, 36 species, 1,324 individuals. — F. H. Bender (Kitchener-Waterloo Field Naturalists Club).

Meaford, Ont. — (East half of town; shore 2 miles eastward; part of escarpment 11th line N., St. Vincent township; 3 feeding stations in town). — Dec. 26, 1950; 10:00 a.m. to 4:00 p.m.; temp. 10°F.; wind N; dull with snow until noon; 6 observers in 2 parties. — American Golden-eye, 3; American Merganser, 17; Black Duck, 1; Ruffed Grouse, 4; Herring Gull, 144 (plus); Rock Dove, 11; Yellow-shafted Flicker, 2; Hairy Woodpecker, 1; Downy Woodpecker, 9; Blue Jay, 11; Black-capped Chickadee, 32; White-breasted Nuthatch, 2; Brown Creeper, 1; Golden Crowned Kinglet, 11; Cedar Waxwing, 38; English Sparrow, 102 (plus); Common Starling, 132 (plus); Tree Sparrow, 3; Slate-coloured Junco, 5; Snow Bunting, 35. Total, 20 species; 564 individuals. — L. H. Beamer.

St. Thomas, Ont. — (Kettle Creek, from St. Thomas to a point 4 miles south, waterworks area, Pinafore Park, Port Stanley harbour, Springwater, Jones' Sanctuary, Dexter. Pasture 15%, creek banks 25%, deciduous woodlots 25%, lake shore 10%, pine groves 15%, cat-tail marsh 5%, town suburbs 5%). — Dec. 24, 1950; 7:30 a.m. to 5:00 p.m.; temp. 28°F. to 10°F.; wind SW to NW, 10 m.p.h. to 20-25 m.p.h.; overcast, except for one brief interval during the morning. Intermittent blizzard conditions after 10:30 a.m. made visibility poor for the remainder of the day. Ground covered with 1-2 inches of snow; creeks and harbour mostly free from ice; 14 observers in 5 parties; total party hours 35 (30 on foot, 5 by car); total party miles 85 (35 on foot, 50 by car).— Great Blue Heron, 2; Canada Goose, 200 (est.); Mallard, 6; Black Duck, 3; Wood Duck, 1; American Golden-eye, 1; Red-tailed Hawk, 6; Rough-legged Hawk, 1; Bald Eagle, 1; Marsh Hawk, 2; Sparrow Hawk, 1; Ruffed Grouse, 2; Herring Gull, 51; Ring-billed Gull, 5; Rock Dove, 100; Mourning Dove, 6; Screech Owl, 1; Long-eared Owl, 4; Pileated Woodpecker, 1; Downy Woodpecker, 10; Horned Lark, 75 (including 2 Northern); Blue Jay, 44; American Crow, 4; Black-capped Chickadee, 49; White-breasted Nuthatch, 2; Brown Creeper, 6; Winter Wren, 6; Golden-crowned Kinglet, 22; Common Starling, 50; English Sparrow, 225; Cardinal, 12; American Goldfinch, 55; Eastern Towhee, 3; Vesper Sparrow, 2; (D.Y., J.F., F.B.); Slate-coloured Junco, 65; American Tree Sparrow, 118; Swamp Sparrow, 1; Song Sparrow, 8; Lapland Longspur, 255 (est.); Snow Bunting, 6. Total, 40 species; about 1,359 individuals. (Seen in area Dec. 16, Carolina Wren; Dec. 23, Cowbird, Purple Finch; Dec. 26, Sharp-shinned Hawk, Cooper's Hawk, Ring-necked Pheasant, Short-eared Owl,

Great-horned Owl, Yellow-shafted Flicker).— Russell Foster, Lloyd Auckland, Marvin Smout, Fred Bodsworth, Charles Johnson, Albert Tier, Ian McKay, Bill Stewart, Campbell Miller, Don Young, Joseph Field, James Young, Lois Pincombe, Marshall Field (St. Thomas Field Naturalist Club).

London, Ont. — (Thomas Valley from London to Delaware, Redman's Swamp, coves and ponds, part of Dorchester Swamp, J. C. Higgins' Farm at Lobo, 2 feeding stations; pasture 5%, deciduous woods 20%, swamp 20%, mixed wooded river bank 55%). — Dec. 30, 1950; 8:00 a.m. to 5:00 p.m.; temp. 22°F. at 8:00 a.m.; wind SW 5-10 m.p.h.; hazy, bright; visibility fair; 12 in. snow on level; river mostly frozen; streams and ponds frozen; 30 observers in 9 parties. — Pied-billed Grebe, 1; Great Blue Heron, 3; Mallard, 6; Black Duck, 25; Wood Duck, 2; American Golden-eye, 155; American Merganser, 32; Sharp-skinned Hawk, 2; Cooper's Hawk, 2; Red-tailed Hawk, 18; Red-shouldered Hawk, 4; American Rough-legged Hawk, 7; Bald Eagle, 1; Ruffed Grouse, 9; Ring-necked Pheasant, 14; Herring Gull, 30; Mourning Dove, 55; Screech Owl, 3; Horned Owl, 3; Snowy Owl, 1; Long-eared Owl, 20; Belted Kingfisher, 6; Yellow-shafted Flicker, 3; Yellow-bellied Sapsucker, 1; Hairy Woodpecker, 8; Downy Woodpecker, 44; Blue Jay, 176; American Crow, 28; Black-capped Chickadee, 290; White-breasted Nuthatch, 16; Brown Creeper, 37; Winter Wren, 7; American Robin, 1; Eastern Bluebird, 2; Golden-crowned Kinglet, 24; Cedar Waxwing, 54; Common Starling, 385; English Sparrow, 396; Eastern Meadowlark, 1; Cardinal, 90; Purple Finch, 29; American Goldfinch, 166; Slate-coloured Junco, 284; American Tree Sparrow, 196; White-throated Sparrow, 2; Swamp Sparrow, 1; Song Sparrow, 22; Snow Bunting, 60. Total 48 species; 2720 individuals. (Seen during period, Sparrow Hawk, Hooded Merganser, Pileated Woodpecker, Pine Warbler, Eastern Towhee). — Carol Bycroft, Dr. R. G. Cummings, John and Tom Cummings, A. Clendinning, Dorothy Coutt, Eli Davis, Vernon Franks, Margaret Ferrier, Ted Garside, Frank Girling, William Girling, John Higgins, Mrs. Landrey, Mr. Lewis, Howard Keast, John Kormos, Gretchen Lawton, Jim Leach, Mrs. Leach, C. Maddeford, W. Maddeford, Donald Pope, Helen Shipley, Keith Reynolds, Matthew Shoenfeld, Douglas Soper, Margaret Stevens, Charles Whitelaw, John Wismer (McIlwraith Ornithological Club.

West Elgin, Ont. — (Aldboro and Dunwich Twps; area within 7½-mile radius of West Lorne; grassy marsh 2%, pasture land 5%, deciduous woods 40%, pine woods 1%, lake front 7%, river and creek sidehills 45%). — Dec. 26, 1950; 7:30 a.m. to 5:00 p.m.; Temp. 10°F. to 12°F.; wind N to NE, 5-8 m.p.h.; Snowing during early a.m., clearing through midday then snowing during late p.m.; 2 inches crusted snow, 3 inches fresh snow; river partly frozen; 6 observers in 2 parties; total hours, 17½ (17 on foot, ½ by car); total miles, 30 (25 on foot, 5 by car). — American Golden-eye, 6; American Merganser, 3; unidentified duck, 61; Sharp-shinned Hawk, 1; Cooper's Hawk, 1; Red-tailed Hawk, 15; Rough-legged Hawk, 4; Bald Eagle, 3; Ruffed Grouse, 2; Bob-white, 21; Ring-necked Pheasant, 20; Mourning Dove, 46; Horned Owl, 2; Short-eared Owl, 1; Yellow-shafted Flicker, 1; Hairy Woodpecker, 4; Downy Woodpecker, 32; Horned Lark, 4; Blue Jay, 85; American Crow, 5; Black-capped Chickadee, 17; White-breasted Nuthatch, 7; Brown Creeper, 11; Winter Wren, 1; Carolina Wren, 1; American Robin, 1; Hermit Thrush, 1 (V.E.L., R.E.L.); Golden-crowned Kinglet, 11; Common Starling, 94; English Sparrow, 112; Bronzed Grackle, 1; Cardinal, 61; Purple Finch, 74; American Goldfinch, 23; Eastern Towhee, 3; Slate-coloured Junco, 56; American Tree Sparrow, 80; Swamp Sparrow, 1 (V.E.L., R.E.L.); Song Sparrow, 7; Snow Bunting, 77. Total, 39 species; 956 individuals. (Seen recently, Great Blue Heron, Marsh Hawk, Sparrow Hawk, Herring Gull, Screech Owl, Northern Shrike). — Jim Bell, Mrs. L. Hauser, H. L. Lancaster, S. M. Lancaster, R. E. Lemon, V. E. Lemon (West Elgin Nature Club).

Port Arthur-Fort William, Ont. — (Shore of Thunder Bay from McKenzie to Fort William and to Kakabeka Falls). — Dec. 30, 1950; 9:00 a.m. to 5:00 p.m.; temp. 11°F. to 13°F.; wind NW 10 m.p.h.; high overcast; rel. humidity 88% at 1:30 p.m.; cones and mountain ash berries plentiful in contrast to last year; 21 observers in 10 parties; total hours 33; total miles 207 (27 on foot, 180 by car). — Ruffed Grouse, 4; Herring Gull, 4; Rock Dove, 90; Snowy Owl, 1; Pileated Woodpecker, 3; Hairy Woodpecker, 9; Downy Woodpecker, 18; Canada Jay, 8; Blue Jay, 48; Raven, 11; American Crow, 6; Black-capped Chickadee, 95; Brown-capped Chickadee, 11; Red-breasted Nuthatch, 23; American Robin, 17; Bohemian Waxwing, 15; Common Starling,

333; English Sparrow, 240; Evening Grosbeak, 39; Pine Grosbeak, 147; Hoary Redpoll, 2; Common Redpoll, 536; Pine Siskin, 8; Slate-coloured Junco, 3. Total, 24 species; 1,671 individuals. (Seen during period, Great Gray Owl, 3). — Mrs. P. and Bill and Peter Addison, Dr. and Mrs. A. E. and David Allin, Mrs. R. M. Beckett, H. K. Campbell, K. W. Denis, Mr. and Mrs. K. Eoll, C. E. Garton, Mrs. M. Knowles, Mr. and Mrs. C. H. Philpot, Mr. and Mrs. C. R. Rogers, Mrs. C. W. and Lawrie Rydholm, I. Shulman, J. Thompson (Thunder Bay Field Naturalists' Club)

Winnipeg, Man. — (5-mile radius centreing on junction of the Red and Assinaboine Rivers; including Assinaboine Park, Kildonan Park, Brookside Cemetery, with their good woods and scrubby woods areas; open pastures in city suburbs; river banks; residential areas; city dumps, including the good-sized mound in the Weston residential area). — Dec. 26, 1950; 9:00 a.m. to 5:00 p.m.; temp. —15°F. to —20°F.; wind SSW, 15 m.p.h.; clear; ground covered with heavy, crusted snow; no open water; 13 field observers in 12 parties; 5 feeding station observers; total hours 43. — Prairie Falcon, 1; Ruffed Grouse, 1; Sharp-tailed Grouse, 17; Hungarian Partridge, 47; Screech Owl, 1; Great Horned Owl, 4; Hawk Owl, 1; Snowy Owl, 3; Hairy Woodpecker, 1; Downy Woodpecker, 10; Blue Jay, 2; American Magpie, 5; Raven, 1; Black-capped Chickadee, 14; White-breasted Nuthatch, 14; Brown Creeper, 1; Northern Shrike, 1; Common Starling, 117; English Sparrow, 600; Common Redpoll, 48; Pine Grosbeak, 3; Snow Bunting, 54. Total, 22 species; 958 individuals. — Gilbert Banks, C. Brereton, Herb. Copeland, Miss W. Downes, Andy Huak, J. Hardisty, Mrs. Hellyar, Hector McDonald, Mrs. E. J. McMillan, Mrs. Mulls, J. J. Mott, Mrs. W. Ricketts, J. B. Sanders, Mrs. W. Scott, Gordon Smith-Barnes, R. W. Sutton, D. H. Young (Natural History Society of Manitoba).

Yorkton, Sask. — (Area 15 miles in diameter). — Dec. 26, 1950; 9:00 a.m. to 3:30 p.m.; temp. —20°F. to —6°F.; wind SW at 15 m.p.h.; clear, sunny, 6 inches of snow; 12 observers in 4 parties; total hours, 6½ (3 on foot, 3½ by car); total miles, 34 (3 on foot, 31 by car). — Horned Owl, 1; Snowy Owl, 2; Downy Woodpecker, 2; Blue Jay, 2; American Magpie, 1; Black-capped Chickadee, 4; Cedar Waxwing, 52; English Sparrow, 54; Common Redpoll, 5; Snow Bunting, 518. Total, 10 species, 639 individuals. (Slate-coloured Junco in same area on Dec. 24. The Cedar Waxwings were seen at close range for the second winter — C.S.H., C.S. and J.S. No Bohemian Waxwings noted thus far this winter). — Mary Belcher, Jerry Bulitz, Brother Clarence, Lionel Coleman, Ronald Coleman, Glen Dawes, C. Stuart Houston, Dr. C. J. Houston, Dr. S. C. Houston, Cliff Shaw, Jeff Smith, Brother Vincent (Yorkton Natural History Society).

Saskatoon-Sutherland, Sask.—Dec. 30, 1950; 8:00 - 11:30 a.m.; temp. 11°F. - 14°F.; wind E, 20 m.p.h.; snowing for whole period; two observers in one party; total miles, 24 (2 on foot, 22 by car). — Grebe (Horned or Eared), 1; Sharp-tailed Grouse, 15 (1 covey); Hungarian Partridge 56 (7 coveys); Ring-necked Pheasant, 1; Rock Partridge, 13; Snowy Owl, 1; English Sparrow, 610 (plus); Common Redpoll, 67; Slate-coloured Junco, 5. (Seen during period, Short-eared Owl, American Magpie, Black-capped Chickadee, Bohemian Waxwing). — F. J. H. Fredeen, J. B. Gollop.

Vernon, B.C. — (Vernon, Okanagan Landing, S end of Swan Lake, Commonage and Cold Stream).—Dec. 31, 1950; 9:00 a.m. to 3:30 p.m.; temp. 37°F. - 41°F.; light N wind; cloudy with sunny intervals in afternoon; no snow at Vernon or Okanagan Landing; up to two inches at Coldstream, Commonage, and Swan Lake; Okanagan and Kalamalka Lakes clear of ice; Swan Lake frozen over except for a small patch of open water at south end; 3 observers in one party; total miles 41 (3 on foot, 38 by car). — Horned Grebe, 6; Trumpeter Swan, 1; Mallard, 249; Baldpate, 4; Redhead, 400 (est.); Ring-necked Duck, 7; Lesser (?) Scaup, 30; American Golden-eye, 23; Buffle-head, 3; Old-squaw, 2; American Merganser, 1; California Quail, 20; Ring-necked Pheasant, 14; American Coot, 10; Wilson's Snipe, 5; Herring Gull, 2; Belted Kingfisher, 1; Red-shafted Flicker, 15; Hairy Woodpecker, 1; Downy Woodpecker, 1; American Magpie, 3; Black-capped Chickadee, 55; Mountain Chickadee, 1; Red-breasted Nuthatch, 1; Brown Creeper, 3; Long-billed Marsh Wren, 2; American Robin, 1; Townsend's Solitaire, 1; Golden-crowned Kinglet, 2; Bohemian Waxwing, 234; Northern Shrike, 2; English Sparrow, 38; Rusty Blackbird, 7; Evening Grosbeak, 82; Pine Grosbeak, 49; Rosy Finch, 7; Common Redpoll, 57; Pine Siskin, 40; American Goldfinch, 34; Oregon Junco, 84; Song Sparrow, 5. Total, 41 species; approx. 1,503 individuals. (Seen during period, Spar-

row Hawk, Mourning Dove). — J. Grant, D. A. Ross, B. A. Sugden.

Summerland, B.C. — (Penticton to north of Summerland along 12 miles of lake shore; Summerland fruit benches back to pine-clad hills). — Dec. 17, 1950; 9:00 a.m. to 3:00 p.m.; mild; light S breeze; cloudy in a.m.; clear in p.m.; snow on high ground; muddy following overnight rain and wet snow; 8 observers in 5 parties. — Western Grebe, 1; Mallard, 17; Baldpate, 11; Green-winged Teal, 5; Redhead, 264 (approx.); Canvas-back, 8; Scaup Duck, 2; American Golden-eye, 2; Barrow's Golden-eye, 2; Sharp-skinned Hawk, 1; Sparrow Hawk, 5; California Quail, 40; Ring-necked Pheasant, 16; American Coot, 300 (approx.); Killdeer, 3; Herring Gull, 4; Kingfisher, 1; Red-shafted Flicker, 28; Hairy Woodpecker, 4; Steller's Jay, 2; American Magpie, 19; Raven, 4; Black-capped Chickadee, 22; White-breasted Nuthatch, 1; Pygmy Nuthatch, 8; Winter Wren, 2; Western Marsh Wren, 1; American Robin, 2; Townsend's Solitaire, 1; Golden-crowned Kinglet, 6; Bohemian Waxwing, 12; Shrike, 1; English Sparrow, 500 (plus); Red-winged Blackbird, 1; Evening Grosbeak, 6; Cassin's Finch, 5; Common Redpoll, 117 (approx.); Pine Siskin, 15; American Goldfinch, 44; Slate-coloured Junco, 325 (approx.); Fox Sparrow, 1; Song Sparrow, 19. Total, 42 species; 1,828 individuals. (Seen during period, Horned Grebe, Buffle-head, Bald Eagle, Pigeon Hawk, Horned Owl, Short-eared Owl, Pileated Woodpecker, House Finch). — Steve Cannings, S. J. Darcus, Wm. Fosbery, Jack Fossick, John and Muriel Holman, Herbert Simpson, E. M. Tait.

Crescent, B.C. — (Parts of coast and bush around Crescent and Ocean Park; White Rock pier and Nicomekl River at Elgin). — Dec. 30, 1950; 8:30 a.m. to 4:30 p.m.; temp. about 40°F.; strong NW wind all day, sea rough; 3 observers; total miles, 20 (10 on foot, 10 by car). — Common Loon, 3; Horned Grebe, 11; Western Grebe, 24; Double-crested Cormorant, 1; Brandt's Cormorant, 3; Great Blue Heron, 1; Mallard, 3; Pintail, 50 (est.); Greater Scaup, 64; American Golden-eye, 16; Buffle-head, 18; Harlequin Duck, 2; White-winged Scoter, 54 (plus); Surf Scoter, 40 (plus); American Scoter, 20; Ring-necked Pheasant, 4; Red-backed Sandpiper, 100 (est.); Glaucous-winged Gull, 558 (est.); Short-billed Gull, 24; Marbled Murrelet, 1; Red-shafted Flicker, 1; Pileated Woodpecker, 2; Hairy Woodpecker, 1; Downy Woodpecker, 3; Black-capped Chickadee, 40; Red-breasted Nuthatch, 2; Winter Wren, 2; Seattle Wren, 1; Golden-crowned Kinglet, 6; English Sparrow, 25 (est.); Western Meadowlark, 6; Pine Siskin, 37; Oregon Towhee, 8; Oregon Junco, 57; Fox Sparrow, 4; Song Sparrow, 5. Total, 36 species, 1,197 individuals. (Seen in area: Brown Creeper, Jan. 1). — H. N. Clarke, M. W. Holdom, E. C. Woodford.

Vancouver, B.C. — (as last year, along North Arm of Fraser R.). — Dec. 26, 1950; heavy fog until 12:30 p.m., then clear and sunny; 6 observers; total hours, 8; total miles, 7. — Common Loon, 17; Horned Grebe, 11; Western Grebe, 43; Double-crested Cormorant, 40; Great Blue Heron, 13; Lesser Snow Goose, 303; Mallard, 411; Baldpate, 300; American Pintail, 20; Greater Scaup, 44; American Golden-eye, 64; Buffle-head, 11; Red-breasted Merganser, 91; Sharp-shinned Hawk, 2; Bald Eagle, 2; Sparrow Hawk, 1; American Coot, 3; Killdeer, 1; Wilson's Snipe, 11; Glaucous-winged Gull, 74; Herring Gull, 37; California Gull, 2; Ring-billed Gull, 3; Short-billed Gull, 130; Screech Owl, 1; Snowy Owl, 3; Short-eared Owl, 1; Belted Kingfisher, 1; Red-shafted Flicker, 20; Pileated Woodpecker, 2; Downy Woodpecker, 3; Horned Lark, 4; Northwestern Crow, 122; Oregon Chickadee, 33; Coast Bush Tit, 20; Winter Wren, 2; American Robin, 58; Varied Thrush, 3; Golden-crowned Kinglet, 50; Ruby-crowned Kinglet, 17; Crested Mynah, 8; Western Meadowlark, 10; Red-winged Blackbird, 10; Brewer's Blackbird, 31; Evening Grosbeak, 180; California Purple Finch, 746; Pine Siskin, 300; American Goldfinch, 30; Oregon Towhee, 17; Oregon Junco, 172; Tree Sparrow, 1; Golden-crowned Sparrow, 15; Song Sparrow, 70. Total, 55 species; 3,582 individuals. — Mr. and Mrs. S. Bradley, Monica Brown, W. B. Butchart, E. Church, Wm. M. Hughes (Vancouver Natural History Society).

Comox District, Vancouver Island, B.C. — (through Courtenay to Comox along river and estuary with side trips, as for several years past; around Comox). — Jan. 2, 1951; 8:45 a.m. to 4:30 p.m.; temp. 30°F. to 36°F.; no snow or ice; 2 observers in 2 parties; total party hours, 12; total miles, about 8 on foot. — Common Loon, 4; Pacific Loon, 18 (plus); Red-throated Loon, 2; Holboell's Grebe, 12; Western Grebe, 1; Pied-billed Grebe, 2; Double-crested Cormorant, 2; Pelagic Cormo-

rant, 21; (probably an under-estimate of the numbers of loons, grebes and cormorants; there had been a great concentration of loons and cormorants, feeding on a school of herring; over 200 Pacific loons and over 500 cormorants); Great Blue Heron, 1; Mallard, 250 (plus); Gadwall, 3 (Fryer; first census record, very rare here); Baldpate, 130 (plus); Pintail, 2; Green-winged Teal, 2; Greater Scaup, 180 (plus); American Golden-eye, 130 (plus); Barrow's Golden-eye, 10; Buffle-head, 70; Old-squaw, 2 (heard); Harlequin Duck, 7; White-winged Scoter, 320 (plus); Surf Scoter, 45 (plus); Hooded Merganser, 4; American Merganser, 2 (unusually low number); Red-breasted Merganser, 7 (at least 500 unidentified duck); Pigeon Hawk, 1; Bald Eagle, 2; Ruffed Grouse, 1; California Quail, 8; Ring-necked Pheasant, 5; Virginia Rail, 1 (Fryer); American Coot, 20; Wilson's Snipe, 5; Glaucous-winged Gull, 700; Herring Gull, 4; Short-billed Gull, 17; Bonaparte's Gull, 2 (Fryer; first winter record); Pygmy Owl, 1; Belted Kingfisher, 1; Red-shafted Flicker, 5; Pileated Woodpecker, 1; Red-breasted Sapsucker, 1; Hairy Woodpecker, 1; Downy Woodpecker, 1; Steller's Jay, 1; Raven, 2; Northwestern Crow, 180; Chestnut-backed Chickadee, 16; Red-breasted Nuthatch, 1; Brown Creeper, 4; Winter Wren, 1; Bewick's Wren, 1; American Robin, 3; Varied Thrush, 1; Golden-crowned Kinglet, 8; Ruby-crowned Kinglet, 1; English Sparrow, 12; Western Meadowlark, 2; Red-winged Blackbird, 20 (plus); Brewer's Blackbird, 200 (plus); Purple Finch, 4; Pine Siskin, 12; Red Crossbill, 8; Spotted Towhee, 12; Slate-coloured Junco, 2; Oregon Junco, 20; Fox Sparrow, 1; Song Sparrow, 7. — Total, 69 species; 3,143 (plus) individuals. (Seen during period: Horned Grebe; Black Turnstone; California Murre; Marbled Murelet; Snowy Owl; Northern Shrike; Golden-crowned Sparrow). — Ralph Fryer, Theed Pearse.

Triple Island Lightstation, B.C. — (20 miles W of Prince Rupert. Bare rocky islets, total area approx. 3 acres; open sea with nearest wooded island 1 mile distant). — Dec. 31, 1950; 9:00 a.m. to 4:30 p.m.; temp. 41°F.-44°F.; wind SE 20 m.p.h. in a.m., W 20 m.p.h. in p.m.; rain; sea choppy; no snow on rocks, 2 observers, since conditions generally would not permit use of a boat, observations made only from lighthouse dwelling with 15X binoculars and 20X telescope; numbers are the maximum seen at one time for each species. — Holboell's Grebe, 1; Horned Grebe, 1; Brandt's Cormorant, 4; Pelagic Cormorant, 5; Harlequin Duck, 8; White-winged Scoter, 6; Surf Scoter, 7; American Scoter, 3; Bald Eagle, 1; Black Oyster-catcher, 3; Surf-bird, 5; Black Turnstone, 60; Aleutian Sandpiper, 75; Glaucous-winged Gull, 30; Herring Gull (? Thayer's), 12; Song Sparrow, 1 (wintering on island). Total, 16 species, 222 individuals. (Seen during period, Common Loon, Duck Hawk, Common Murre, Pigeon Guillemot, Snowy Owl, Raven, Crow). —G. C. and J. M. Odlum.

TWO NEW OXYTROPIS FROM ARCTIC ALASKA AND YUKON[1]

A. E. PORSILD
National Museum of Canada.

FOR quite a long time I have been aware of the presence, in calcareous mountains of Alaska-Yukon, of two most elusive species of *Oxytropis* — one tall, the other low — but, although on a number of occasions our "trails" have crossed, I have only recently secured good material of either.

With the first I struck up a "fleeting" acquaintance when, 25 years ago, on a winter journey through Alaska, I came across its dried up seed pods protruding through the snow, on a sparsely timbered slope of the Baird mountains, east of Noataq River in northwestern Alaska. Although I succeeded in digging up the wilted plant, I never managed later to match it with any species of *Oxytropis* known to me, and our "acquaintance" thus remained distant and aloof.

With the "little fellow" I had fared but slightly better. From time to time, in various

[1] Received for publication February 2, 1951.

Plate 1. OXYTROPIS JORDALII n. sp.: Fig. 1, flowering plant, x ½; fig. 2, flowering spikes, x 8/5 (Jordal, No. 2252) fig. 3, fruiting plants, x ½ (Type: Jordal, No. 3580); fig. 4, fruiting plant, x ½; figs. 5 and 6, fruiting spikes, x 8 5 (figs. 4-6 from Jordal No. 3644); fig. 7, fruiting spikes, x 8/5 (from Type: Jordal, 3580).

collections of Alaska and Yukon plants, I had come upon over-mature scraps of a small *Oxytropis* of which the fruiting plant resembled *O. terrae-novae* Fernald, otherwise endemic to Newfoundland, Labrador and the Hudson Strait region. The Alaska plant, however, was considerably smaller, and on phytogeographical grounds alone, it did not seem likely that they could actually belong to one and the same species, although, as demonstrated by Fernald, a number of other plants found in Newfoundland and the Gulf of St. Lawrence have proved to have just that kind of curious, bicentric range.

My first meeting with it "in the flesh" was in 1944 when, at the end of a most profitable field season spent in southeastern Yukon, I made a rapid reconnaissance trip over the newly completed Canol Road, from the Yukon-Mackenzie divide in the Mackenzie Mountains east to Norman Wells on the Mackenzie. The season was then far advanced and, following a few days of sharp frost accompanied by a snowfall, all green vegetation was killed. The new snow, however, had disappeared again, except on the highest peaks, and most species were recognizable even though rarely in condition for the making of satisfactory herbarium specimens. Owing to the lateness of the season and to other commitments, time, moreover, permitted of only the very briefest stops; this was the more exasperating because every "peek" from the driver's seat, so to speak, revealed botanical treasures such as *Alopecurus alpinus, Deschampsia brevifolia, Puccinellia Vahliana, Carex petricosa, Luzula arcuata, Salix phlebophylla, Claytonia megarrhiza, Arenaria arctica, Melandrium macrospermum, Papaver Keelei, Melanidion boreale, Saxifraga radiata, Parnassia fimbriata, Potentilla biflora, P. elegans, Polemonium boreale, Campanula aurita, Antennaria densifolia, A. Ekmaniana, Saussurea angustifolia* var. *yukonensis, Senecio Lindstroemii* and *Taraxacum alaskanum,* to mention only some that were either new to the flora of the Northwest Territories or, in the case of several, new to the flora of Canada or even new to science (see Porsild, Bull. Nat. Mus. Can., 1945).

On turfy limestone barrens near timberline, first at Sekwi River and later at Bolstead Creek, did I, at last, meet face to face with my little *Oxytropis* but, alas, again only with fruiting spikes and frost-killed, wilted leaves. Unknown to me then, it had been collected there earlier in the season by Professor V. C. Wynne-Edwards, then of McGill University, who turned his collection of plants over to me, thereby contributing a number of species I had not seen myself. Unfortunately, his specimens of the little *Oxytropis* were not much better than mine although one dwarf specimen collected near a snowbank on a high mountain, late in July, had a few, if badly faded, flowers.

In the field, and later in the herbarium, the fruiting plant undeniably bore a strong resemblance to *O. terrae-novae* and, although I had not seen good flowering material, and despite the distinctly narrower and more subulate teeth of the calyx, I could do no better than refer it there (Porsild, l.c.).

Great was my joy, therefore, some time ago, to find both my elusive *Oxytropis* represented by large series of flowering and fruiting plants, in a collection of critical *Oxytropis* sent to me for determination by Mr. L. H. Jordal of the staff of the Botanical Garden of the University of Michigan. The collection came from Brooks Range, Alaska, where Mr. Jordal, in 1949 and again in 1950, made large collections of plants containing, besides these, many other rarities.

With this good material before me it is quite clear that what I had first recorded as *Oxytropis terrae-novae* is really quite distinct, for not only are the flowers considerably smaller, and lemon-yellow instead of purple, but the calyx teeth are of a very different shape. Although, perhaps actually most closely related to *O. terrae-novae,* our northwestern plant is clearly distinct, and it is a great pleasure to name it for Mr. Jordal.

The other *Oxytropis* proved, without much doubt, to be the plant which I first saw in the Baird Mountains 25 years ago. It is a tall and very handsome species, undoubtedly undescribed, and possibly related to the little known *O. Roaldii* or *O. arctica* although obviously well separated from both.

Oxytropis Jordalii n. sp. Plate 1, figures 1-7.

O. terrae-novae Porsild in Nat. Mus. Can. Bull. 101:24 (1945), not Fernald.

Laxe caespitosa e basi ample ramificata.— Folia ca 4 ex eodem ramo, 6—10 cm longa.— Foliola 4 — 5-juga, angusta lanceolata subinvoluta, superne glabrata vel sparse strigosa et saturate viridia, inferne argentato-sericea. — Rhachis teres aut obscurissime canaliculata, purpureo-viridis, appresse strigosa, laminam aequans vel modice superans.—Stipulae

parvae et firmae pubescentia argentea densa et longa, libera parte abrupte brevi-attenuata, uninervia. — Scapi graciles ascendenti — erecti, 10 - 14 cm alti, parum folia superantes et fructiferi haud elongati, obscure purpurei, sparse sericeo-pubentes. — Inflorescentia brevis subcapitata, 5 - 7-flora, fructificatione non elongata. — Calyx campanulata, 4 - 5 mm longa, dentibus 1.5 mm longis subulatisque exceptis, appresse sericea pilis nigris et albis intermixtis. — Corolla ca 10 mm longa in vivo pallide virescenti-lutea, carina maculis bilateralibus purpureis, siccitate eburneae. — Legumina crassa, in calyce sessilia, ca 12-15 mm longa, rostro abrupte contracto excepto, obscure viridia, pubescentis nigra appressa. — Semina viridi-brunnea.

Brooks Range, Alaska: Scattered in dry, open subalpine spruce forest on the north shore of Old John lake, fruiting specimens on July 16, 1950, *L. H. Jordal, No. 3580*[2] (Type, Can 202678); open, bare ground in open spruce woods, on lowlands near Arctic Village, fruiting specimens, July 22, 1950, *idem, No. 3644;* dense tufts on mossy hummock along trail in open spruce woods at Glacier Creek, ca. 20 miles by trail north of Wiseman, flowering specimens on July 9, 1949, *idem, No. 2252.* Endicott Mountains: North slope, on upper Anaktuvuk R., 69° 45-49' N. — 151° W., June-September, 1945, *Chapman and Fellows, Nos. 8 and 10* (US *1898379* and *1898377*), both distributed as *O. Maydelliana.*

Northwest Territories, Canada: East slope of Mackenzie Mountains, along Canol Road, Plains of Abraham, *Porsild, No. 11,817;* Sekwi R., *idem, No. 11,873;* Bolstead Creek, *idem, No. 11,933; ibid. Wynne-Edwards, No. 8346.*

A comparison of the plant from the Mackenzie Mountains with the fine series of flowering and fruiting plants collected by Mr. Jordal in the Brooks Range at once discloses that both belong to one and the same species which, however, cannot be referred to the much coarser, large- and purple-flowered *O. terrae-novae* of the eastern Arctic. From *O. Scammaniana* Hult. recently described from mountains of central Alaska, and recently also recorded from southwestern Yukon, our plant differs by its more numerous and creamy white or greenish-yellow flowers, by its larger size and pubescent and more pointed stipules.

[2] According to Mr. Jordal duplicates of the types of this and also O. koyukukensis deposited in U.S. National Herbarium and in the Herbarium of the University of Michigan.

Distribution: Thus far known only from the Brooks Range Alaska and from the Mackenzie Mountains, N.W.T. It will, undoubtedly, also turn up in mountains of northern Yukon.

Oxytropis koyukukensis n. sp. Plate 2, figures 1-5.

O. ? *erecta* Anderson Fl. Al. and adj. parts of Canada, p. 406 (1947), not Komarov.

Planta caespitosa ramis multicipitibus erectis et saepe ramificatis e radice subligneo, sed non crasso. — Folia terna vel quaterna ex apice rami, 10 - 15 cm longa. — Foliola 15 - 25, plurima alternantia, pauca opposita aut interdum subverticillata, maturitate 12 - 15 mm longa, lanceolata subinvoluta pallide viridia, supra glabrata aut parce pilis longis albis induta, subtus albovillosa. — Rhachis petiolusque canaliculati, pilis longis mollibus albis sparsis. — Stipulae maximae pallide chartaceae, pilis longis albis munitae, earum liberae partes longo-attenuatae univerviae et ad marginem papillis magnis paucis instructae. — Scapi adscendentes-erecti graciles 15 - 20 cm alti, folia valde superantes, pallide virides villosi pilis mollibus et sparsis albis. — Inflorescentia 10 - 14-flora, brevis plus minusve capitata, fructificatione non elongata; in anthesi flores plerumque sunt in pares horizontaliter distantes. — Bracteae lineares hirsutae calyce multo breviores. — Calyx conspicue caeruleo-viridis et dense grisseo-villosus, tuba 6 - 8 mm longa, duplo longior quam dentes subulati nigro-hirsuti. — Corolla ca 20 mm longa, in vivo purpurascenti caerulea, siccitate azurea. — Legumina in calyce sessilia ca 14 mm longa, rostris longis griseo-pubescentibus exceptis. — Semina nondum visa.

Brooks Range, Alaska: Dense clumps in dry, open fields near Wiseman, flowering specimens (with last year's fruiting spikes) on June 15, 1949, *L. H. Jordal, No. 1763* (Type, Can *196435*); scattered clumps on gravel bars in the river ca 1 mile north of Wiseman, *idem No. 2035;* north slope of Brooks Range, Dolamnagavik R. west of Killik R., 68° 50' N. - 154° W., June 5, 1946, *R. M. Chapman, No. 93* (US); Anaktuvuk R. valley, 69° 15-45' N. — 151° W., June-Sept. 1945, *R. M. Chapman* and *R. E. Fellows, Nos. 7, 11, 13 and 14* (US *1898380*).

A tall and strikingly handsome species which is abundantly distinct from, but perhaps most closely related to *O. arctica* or to the little known *O. Roaldii.* From both it

Plate 2. OXYTROPIS KOYUKUKENSIS n. sp.: Fig. 1, flowering plant x ½; fig. 2, flowering spike x 8/5, (both from Type: Jordal, No. 1763); fig. 3, leaf showing sub-verticillate leaflets, x 8 5; fig. 4, flowering spike, x 8/5; fig. 5, fruiting spike, x 8/5 (all from Jordal, No. 2035 (Can.).

is at once distinguished by its large, and very conspicuous, pale stipules and by the apparently characteristic habit of horizontally spreading flowers. The entire plant lacks verrucose glands. *Oxytropis koyukukensis* does not even closely resemble *O. erecta* Kom. of Kamtchatka which has conspicuously dark brown and rather tight stipules, erect flowers and lacks the long, silvery white pubescence of our plant.

Distribution: Thus far known only from the Brooks range but is probably found also in the mountains of northern Yukon.

NOTES AND OBSERVATIONS

Intimidation display of Red-bellied Snake. — On April 28, 1948, I found a Red-bellied Snake, *Storeria occipito-maculata,* in a ploughed field near Sault Ste. Marie, Ontario. After examining the reptile's tail, I tentatively identified it as a female. When I first seized her, she writhed her tail violently, smearing herself and my hand with a white fluid discharged from her anus.

I replaced the snake on the ground, and she began to crawl rapidly away. However, I blocked her path repeatedly with my hand. After a few minutes of this behaviour, she changed her tactics and performed an intimidation display which I had never before observed in the species.

She flattened her body to almost twice its normal width, so that the ventral surface was flat for the full width of the scutes. Raising her head almost an inch from the ground, she curved the anterior two inches of her body into an "S", with the side of her head touching the side of her neck, and flickered her tongue rapidly. When I brought my finger near her head, she allowed her head to drop suddenly downward and forward to the ground, as if striking. Her whole appearance was that of an extremely venomous reptile. However, when I picked her up during this display, she relaxed her body into its normal shape and attempted to wriggle free.

I was able to make the snake repeat this performance three times. However, after half an hour of captivity, she refused to display again. I have never seen similar behaviour since, nor have I read of it. — FREDERICK E. WARBURTON, Owen Sound, Ontario.

A bat on the ground in daylight. — On May 16, 1950, I was searching for the nest of a Spotted Sandpiper on a gravel bank beside the Sydenham River in Harrison Park at Owen Sound, Ontario. My feet often dislodged stones and sand which would slide a foot or two down the embankment before coming to rest. On one such occasion, I heard a shrill squeaking near my feet, and, on looking down, saw a bat trying to free itself from the gravel in which it was partly buried. The animal had apparently been carried a few inches by the slide, and lay on its back with one wing and the posterior part of its body buried. It spread its free wing, and writhed its body, squeaking and showing its teeth. Within a few seconds it had freed itself, and fluttered slowly to a cedar tree about fifty yards away, among the foliage of which it disappeared.

I stooped to watch, and so was able to observe the bat at a distance of a yard or less for several seconds. I have no doubt that it was a species of the genus *Myotis,* and was probably the Little Brown Bat, *M. lucifugus.*

This occurred about three p.m. Between two and four o'clock, I saw three other bats, apparently of the same genus, in active flight, and saw one fly down and capture several insects, although the afternoon was brilliantly sunny. However, I doubt that a bat, if awake and alert, would have allowed me to approach so closely as to step almost on it, even if it had alighted on the ground. At any rate, I had the ground under careful scrutiny as I walked about. It seems more likely that this individual had chosen a small cavity between two stones for its diurnal sleep. — FREDERICK E. WARBURTON, Owen Sound, Ontario.

Manitoba bird records, 1950. — On September 15, 1950, an Indian, Lazarus Partridge brought to Sam Waller at The Pas two ducks for identification; he shot them that day near Pike Lake, Big Eddy, North of The Pas. Sam Waller consulted R. W. Sutton, Technician at the Manitoba Museum, who happened to be present. Both birds proved to immature Harlequin ducks, *Histrionicus histrionicus.* Mr. Waller kindly presented one specimen to the Museum (No. 2692). A previous presumably Manitoba record is given by Preble (1902, N. A. Fauna, No. 22, p. 86) who said that Blakiston (1863, The Ibis, Vol. 5, p. 149) examined one at York Factory.

On October 23, 1950, Dr. Roper G. Cadham of Winnipeg shot a Greater Snow Goose *Chen*

hyperborea atlantica near Westbourne, Manitoba; this bird was the third in a flock of immature snow geese. It is an adult female, weight 6 lbs. 13 oz.; T. 1.30.04; W. 17.1; spread 60.1; Tar. 3.5, Cul. 2.3; Tail 6.6. This appears to be the first authentic record of this race for Manitoba. It has been mounted, (Mus. No. 2693). — L. T. S. NORRIS-ELYE, Manitoba Museum, Winnipeg, Man.

Lake Erie ciscoes free of Triaenophorus crassus. — In recent years biologists, commercial fishermen and fish dealers have been forced to take cognizance of the occurrence of cysts of the parasite *Triaenophorus crassus* in the flesh of various species of coregonid fishes, such as the fresh water herring or cisco *(Leucichthys sp.)* and the whitefish (*Coregonus clupeaformis).* Commercial fishermen of the lakes of northwestern Ontario and of the Prairie Provinces have been most seriously affected by export restrictions imposed upon them when the fish they attempted to market were found to be infested by this parasite.

While no record of the occurrence of this species of parasite appears to have been noted from lake Erie, the writer thought it advisable to place on record the findings of a recent study.

Approximately 1800 ciscoes *(Leucichthys artedi)* comprising over one ton of fish, were sliced and filleted in the course of an investigation conducted on lake Erie, yet not one cisco was found to contain any evidence of *Triaenophorus crassus.* It appears therefore that the lake Erie cisco is free from infestation by this parasite. — W. B. SCOTT, Curator, Division of Ichthyology and Herpetology, Royal Ontario Museum of Zoology, Toronto.

White-throated Sparrow at Goose Bay, Labrador. — While employed with the Entomological Survey of the Arctic sponsored by the Department of Agriculture and the Defence Research Board of Canada the writer had an opportunity of observing birds at Goose Bay, Labrador, during June, 1948. The centre at which observations were made was the Goose Bay airport situated at about 53° 20' N, 60° 25' W on a sandy peninsula which lies between the Goose River and Terrington Basin on the north and the Hamilton River on the south, and juts eastward into Goose Bay. The central part of the peninsula is occupied by a sandy plateau. The edge of this plateau is formed by a 100-foot contour line at which the land drops abruptly to the lower level of the peninsula which is occupied by a black spruce-sphagnum bog extending southward to the Hamilton River and northward to the Goose River and Goose Bay. White-throated sparrows, *Zonotrichia albicollis* (Gmelin), were heard in song frequently during June. The first bird was seen on June 5 when it was singing in a bush at the southern border of the airport on the upper plateau. On this plateau the birds frequented the growths of dwarf birch. On the lower level of the peninsula they were seen in black spruce trees around the borders of open areas in the sphagnum bog. Austin (Birds of Newfoundland Labrador, 1932, p. 195) calls this species a rare summer resident in extreme southern Newfoundland Labrador, his northernmost record being an old one at Grand Falls, Hamilton River. — W. W. JUDD, Department of Zoology, University of Western Ontario, London, Ontario.

Notes on the Peromyscus of Ontario. — The limits of distribution in Ontario of the species and subspecies of *Peromyscus* are known only in a very general way. Of the two most familiar forms, *P. leucopus noveboracensis* and *P. maniculatus gracilis,* it is understood that the former inhabits the whole of the southern peninsula, north to the neighborhood of latitude 45° 00', while the latter continues from there northward until it eventually becomes *P. m. maniculatus* somewhere in the more northern part of the province. *P. m. gracilis* has been taken south to approximately latitude 44° 45', and *P. l. noveboracensis* north beyond latitude 45° 30'. There is thus a wide area across which the two species overlap.

There are old records of *gracilis* far south of its present known range, and toward the south it tends to exist in isolated pockets. This evidence, and indications that toward the north *noveboracensis* seems to be most frequently found in country which has been partially cleared suggest the theory that the former is retreating to the north and the latter advancing in that direction.

In view of all this and considering that references to the status of these two species where their ranges overlap in Ontario are practically non-existent in the literature, it seems to me that even a small amount of definite information should be published. Situations wherein field workers dealt with the two forms for a considerable time with-

out appreciating the specific distinction are not unknown.

In the immediate vicinity of Huntsville, Muskoka, latitude 45° 19', *P. m. gracilis* and *P. l. noveboracensis* exist in approximately equal numbers, to a large extent sharing the same habitat, and apparently living in very close association. In the following incident there is even a suggestion that they share the same winter nest: On January 2, 1951, traps were set for mice that were living in the hollow corner post of a woodshed, from which they were making nocturnal raids on a bird feeding station. On the first night a male *noveboracensis* was taken, and the following night a female *gracilis* in the same trap. External measurements of these two mice were: *noveboracensis* — total length 166 mm., tail 80, hind foot 21, ear 17.5; *gracilis* — t. l. 173, t. 92, h. f. 20.5, e. 18.5. These measurements are a fair average of the variation between the two species in this locality.

There is some evidence, requiring further confirmation, that this relationship between *P. l. noveboracensis* and *P. m. gracilis* extends at least 25 miles north of Huntsville. There have been no reports of *noveboracensis* from the rather extensive work which has been done in Algonquin Park, some 50 miles to the east of Huntsville, but a series of 24 specimens in my collection from Honey Harbor, about 50 miles to the southwest, are all *noveboracensis.*

Of the 38 skins from Huntsville in my collection, taken from 1938 to 1950, 15 are referable to *P. l. noveboracensis,* 15 to *P. m. gracilis,* and 8 do not show distinguishing characters clearly enough to make identification certain. — RUSSELL J. RUTTER, Huntsville, Ont.

Breeding-Bird Census 1950. — Pastured Woodlot (mixed deciduous woods with grassy clearings).

Size: 15 acres.

Location: Carleton County, one mile south of Beattie Point, Ottawa River.

Description: The plot is L-shaped, bounded on the south and east by open pasture and cultivated fields, on the north by open pasture and farm buildings and on the west by swampy woodland of similar type. The ground is high and rocky but relatively flat, dropping suddenly at the west boundary to the swampy area. It is lightly browsed by cattle and swine. Open clearings are interspersed among dense sapling growth and mature trees.

A complete survey of vegetation has not yet been made. Principal dominant trees are Pignut Hickory (*Carya glabra*), D.B.H. 6-10 inches, and Oak (*Quercus* spp.), D.B.H. 10-14 inches. Several large American elm (*Ulmus americanus*) and a few Beech (*Fagus* sp.) are present. Subdominants include maple (*Acer* sp.), heavy growth, D.B.H. 2-4 inches, sumac, hawthorn and birch. Typical pasture flora, bracken fern and poison ivy comprise the major ground cover.

Coverage: May 7, 14, 21, 28; June 5, 11, 18, 21, 25, 28; July 1, 8, 11. Total 106 hours. (4 participants).

Census: Wood Pewee 53 (8N), Red-eyed Vireo 33 (4N,1M); Chipping Sparrow 27 (3P,1Y); Yellow-shafted Flicker 20 (3N); Redstart 13 (1N,1P); Indigo Bunting 13 (2P); Hairy Woodpecker 7 (1N); Crested Flycatcher 7 (1N); Catbird 7 (1N); Bluebird 7 (1P); Least Flycatcher 7 (1M); Ruffed Grouse 7 (1Y); Cowbird 7 (1E.P.). Total: 13 species; Density (exclusive of cowbirds) 200 pairs per 100 acres.

Visitors: (exclusive of migrating warblers, etc.) Black-billed Cuckoo; Downy Woodpecker; Eastern Kingbird; Eastern Phoebe; American Crow; Bronzed Grackle; Rusty Blackbird; American Robin; Olive-backed Thrush; Veery; Cedar Waxwing; Yellow Warbler; Baltimore Oriole; Scarlet Tanager; Goldfinch; Rose-breasted Grosbeak; Ovenbird; Towhee; Brown Thrasher; Starling; Great-Horned Owl. — JOHN W. ARNOLD, RUTH M. HORNER, VERNA ROSS, MARY STUART, Ottawa.

BREEDING CENSUS

Location: On Beattie Point, Lake Deschenes, ten miles from city of Ottawa, Ontario.

Area: Open grassland with scattered trees; light sandy soil.

Description: 27 acres abandoned pasture, mixed grasses, alfalfa and weeds. Crossed by remains of several farm hedgerows containing piles of boulders and prickly ash thickets. Some 20 medium-sized basswood and elm trees. Thin scattering of small hawthorn bushes.

Edge: Tract bounded on all sides by similar grassland for several hundred yards.

Coverage: At least 3 times each week from May 1 to July 31, 1950. Hours varied from 8.30 a.m. to 7 p.m. Total man-hours 84.

Breeding Population: (Actual numbers of breeding pairs, and in parentheses number of pairs per 100 acres when more than 3 territories in the area). Bobolink 10 (37); Eastern Meadowlark 8 (30); Savannah Sparrow 8 (30); Song Sparrow 6 (22); Upland Plover 1.5; Mourning Dove 1; Flicker 1; Eastern Kingbird 1; Loggerhead Shrike 1; Starling 1; Yellow Warbler 1; Red-winged Blackbird 1; Total pairs 40.5/27 acres (150/100 acres).

Visitors: (Actual numbers of individuals). Wilson's Snipe 2; Bluebird 3; Robin 2; Brown Thrasher 1; Baltimore Oriole 1.

Remarks: The Redwing nested in a thorn bush 400 yards from the nearest water. Cowbird eggs were laid in nests of Yellow Warbler and 2 Meadowlarks, all within 100 yards.

Observers: Mrs. D. B. O. Savile and T. F. T. Morland.

A Cormorant tragedy. — Walking along the beach at St. Augustine, Florida, on February 25, 1950, I noticed the body of a large dark bird rolled shoreward by the breakers. When close enough I retrieved it and saw that it was a Double-Crested Cormorant — (*Phalacrocorax auritus*). It was but recently dead. Wondering what had caused its death I noticed that there was a large swelling in the throat. With difficulty I squeezed this towards the beak and pulled out a 7 x 6 inch flounder. The bird had evidently seized the fish head first and tried to swallow it. It was too large to go down the throat of the bird and the fins sloping backwards prevented it from being ejected and the bird was choked. — HENRY A. C. JACKSON, Montreal West, Que.

An Otter at Niagara Falls. — On January 20, 1951, about 3 o'clock in the afternoon, while driving around Dufferin Islands, a semi-artificial back water area of the Niagara River, with an intake on the south controlled by Hydro Electric Power development, and an outlet on the north directly into the Upper Rapids, a short distance above the Horseshoe Falls, I sighted a large and active mammal moving around on the ice. The mammal, which was almost immediately judged to be an Otter (*Lutra canadensis*), was first sighted as I passed a group of islets connecting the mainland with the south side of the large central island. Upon stopping the car, and focusing 8-power field-glasses upon the animal, my initial supposition that I had been looking at an Otter was readily confirmed beyond a shadow of doubt.

The Otter, which was not a large one, and would probably be a female, or a young dog of the year, was unsuspicious of the car, and allowed me to make prolonged observations, at a distance of 100 to 150 feet, as it ran around on the ice and made repeated dives through a brimming hole near the centre of the frozen area, slithering in through the hole with scarcely a ripple, and projecting itself out again with the same smooth action. Finally it came out of the water, through the hole, with an astonishingly large fish, probably a carp, which, although seized firmly just back of the head, continued to show a lot of life and action as it was carried by the Otter to a hole on the central island between some large embankment stones. While I continued to watch the hole entrance, through field-glasses, the fish flapped into view as though trying to escape back over the ice into the water. This appearance and reappearance of the fish from the embankment hole occurred on three separate occasions for each time, it was followed, seized, and carried back to the hole by the Otter before it had flip-flapped itself very far from the entrance; the Otter giving the appearance of playing with the active fish, much as a cat with a mouse. During these observations, two Muskrats appeared on the ice near one of the islets, and although all three mammals were, at times, in fairly close proximity, no apparent notice was taken of the Muskrats by the Otter, or of the Otter by the Muskrats. After the third appearance of the fish and the Otter from the hole in the embankment and the subsequent disappearance back into the hole of both the beast and its prey, I left the point of observation and drove around the islands, and upon returning to the same spot was just in time to see the fish, which seemed remarkably tenacious of life, appear again from the hole in the embankment, and somewhat feebly flop around upon the ice; but this time, the Otter appeared to be tiring of the game for it quickly seized the large fish in a determined manner, and quieting its struggles, and carrying it up over the stone enbankment, shortly disappeared among the tall grass and weeds, and irregularity of the ground, on the large central island. These observations were made at a time when the weather was very mild,

with temperatures of 50° to 55°F., and although dull and cloudy, visibility at ground level was clear, and generally excellent for observing wild life.

Although I know of no other recorded occurrence of the Otter at Niagara Falls, or in the Niagara area, Mr. A. R. Muma, Welland County Conservation Officer of the Ontario Department of Lands and Forests, has informed me that he received a report in January, 1950, of a supposed Otter seen sliding on the snow covered banks of Ussher's Creek, at a point about 300 feet from its confluence with the Niagara River, which would be approximately 4 miles southeast of Dufferin Islands. Unfortunately, Mr. Muma was unable, by personal observation, to confirm this report, but his informer's descriptions of the animal, and its action, left little reason to doubt the presence of an Otter at that time. — R. W. SHEPPARD, 1805 Mouland Avenue, Niagara Falls, Ontario.

The Thresher Shark in British Columbia. — The Thresher shark, *Alopias vulpinus* (Bonnaterre), is not commonly taken in British Columbia waters. Up to the year 1946 but one specimen was represented in collections and only a few others had been reported (Clemens and Wilby, Fishes of the Pacific Coast of Canada, Fish. Res. Board of Canada, Bull. 68, 1946).

One such report appeared in the Vancouver Daily Province under date line of August 24, 1945 as follows:

"Goose Bay Man Lands Big Shark.

Goose Bay, August 24. — William Olsen, a fisherman, caught a 200 pound thresher shark on his trolls. He hauled it aboard and shot it.

Thresher sharks reportedly fasten onto whales and pound them to death by thumping them with their tails.

They grow to a length of 15 feet and feed normally upon herring and pilchards.

Hunting in pairs, they herd the fish into compact bodies by encircling them and splashing the water with their tails. Then they proceed to gorge themselves."

Two other British Columbia records of this shark have recently come to notice. In view of the general lack of information concerning this fish these records are worthy of note.

The first of these is provided by a specimen taken by Mr. Donald Keirs of Victoria, B.C., while trolling for salmon in Finlayson Arm of Saanich Inlet on July 24, 1949. This fish, which was taken on a Number 6 "Wonder" spoon on 350 feet of line, had a body length of about two feet. It was lifted partially clear of the water so that the elongated tail fin was clearly seen, but the specimen was not saved.

The second record is based on a report of a thresher shark taken about the middle of September, 1949, at Robson Bight, Johnstone Straits, in a gillnet operated by Mr. Douglas Burnett of Quathiaski, B.C. The shark was reported as being "about six feet in length with the tail almost as long again." The record is substantiated by a snap-shot of the shark taken by Captain Bob Lewis of Campbell River, B.C.

I am indebted to Mr. Don Keirs of the British Columbia Game Office, Victoria, for information concerning the shark taken in Finlayson Arm and to Mr. R. G. McIndoe, Fisheries Inspector, Campbell River, for material on the specimen taken in Johnstone Strait. — G. CLIFFORD CARL, Provincial Museum, Victoria, B.C.

Two New Bird Records for Nova Scotia. — It is a pleasure to be able to record two species of birds not previously reported from Nova Scotia:

Long-billed Marsh Wren. *Telmatodytes palustris.* — One was taken at Mink Island, Port Joli Harbor, Queens County, on Nov. 15, 1949, by Dr. H. F. Tufts of Port Mouton, Nova Scotia. This bird was one of three which he saw together, noisy and active, clinging to the stems of a clump of tall dry weeds, which was later identified as *Phragmites communis,* which incidentally is a rare plant in Nova Scotia.

Orange-crowned Warbler. *Vermivora celata.* Early in January 1951, a strange bird appeared at the feeding station of Mrs. Brenda Curry, Boulderwood, Halifax. Among other kinds of food displayed there, was a can containing fat which had mixed with it, chopped nuts and dried fruit. The bird was attracted to this and fed there regularly several times daily until Feb. 7. The next morning it was picked up dead under the feed tray and sent here for identification. It proved to be an Orange-crowned Warbler and its physical condition was such as to indicate that it had been well nourished. Both these specimens were mounted and may be seen in the collection at the Nova Scotia Museum at Halifax. — R. W. TUFTS, Wolfville, N.S.

REVIEWS

A New Subspecies of Moose from North America. *By Randolph L. Peterson. Occasional Papers of the Royal Ontario Museum of Zoology, No. 9, May 25, 1950, 7 pp., 2 figs.*

Moose inhabiting northern Michigan and Minnesota, western Ontario, and the country west to central British Columbia, and north to eastern Yukon Territory and Mackenzie Delta, N.W.T., heretofore referred to the nominate race are racially separated in this paper from the eastern population. The new race is said to differ in skull characters and to be intermediate in colour between *Alces americana shirasi* and the nominate race. This new subspecies is named *Alces americana andersoni* as a tribute to Dr. Rudolph M. Anderson and his contributions to Canadian mammalogy. — W. EARL GODFREY.

A Study of Bird Populations in the Apple Orchards of the Annapolis Valley, Nova Scotia, with Particular Reference to the Effects of Orchard Sprays Upon Them. *By John P. Kelsall. Canadian Wildlife Service, Wildlife Management Bull., Ser. 1, No. 1, April, 1950, 63 pp., 12 figs.*

This interesting report is based on investigations made by the author in the period May to September, 1946. Work was concentrated on 10 apple orchards in the Annapolis Valley, Nova Scotia. Poisoned sprays, as normally applied in commercial orchards there, appeared to have no readily observable direct effect on migratory bird populations nesting or feeding in these orchards.

In average commercial orchards, where insect life is at a minimum, bird populations averaged about one per acre; but in cases where outbreaks of insects occurred bird numbers rose to at least 11 per acre. The Song Sparrow, Robin, Chipping Sparrow, and Slate-colored Junco made up over 75% of the birds observed in normal orchards. In budmoth-infested orchards, however, the Savannah Sparrow was found more frequently than the Slate-colored Junco. Warblers were observed to predominate in an aphid-infested orchard.

Robins appeared to be the only species regularly taking up nesting territory within the orchards. Other species occurring there were classed as:

"(a) Birds which enter orchards in the course of their daily activities because they have nesting territories, or find suitable habitat, immediately adjacent.

(b) Non-nesting birds which will visit and remain in orchards provided suitable feeding conditions are to be found.

(c) Stray or occasional visitors.

(d) Nesting birds from nearby habitats which will visit orchards for feeding purposes provided suitable food is present in unusual abundance."

Twelve photographs illustrate orchard types and some insect infestations. — W. EARL GODFREY.

Prince Albert National Park Creel Census Analysis, Season 1948. *By Victor E. F. Solman, Canadian Wildlife Service, Wildlife Management Bulletin, Ser. 3, No. 1, May, 1950, 29 pp., 1 map.*

Since 1940, anglers visiting Prince Albert National Park have recorded, on cards prepared for the purpose, details concerning the fish they caught there, the time required for capture, measurements of individuals, and other related information. In 1947 and 1948 respectively, 1,946 of these creel census cards were completed. Data bearing on six lakes and such fishes as pike, yellow pikeperch, lake trout, smallmouth bass, whitefish, burbot, tullibee, perch, and sucker are summarized and interpreted to show population trends. There is a concise but interesting analysis of local fishing methods and lures. A good map shows the location of the lakes concerned. — W. EARL GODFREY.

Canada Geese of the Mississippi Flyway With Special Reference to an Illinois Flock. *By Harold C. Hanson and Robert H. Smith; Bull. Illinois Nat. Hist. Survey, March, 1950, Vol. 25, Art. 3, pp. 67-210, 82 figs., 47 tables.*

Horseshoe Lake Game Refuge, in extreme southern Illinois, is one of the areas where Canada Geese have been induced to congregate and winter in large numbers, about half the winter population of the Mississippi River valley being concentrated there. Problems arose when the geese left the Refuge to feed over a 15-mile radius thus providing excellent hunting to gunners outside the Refuge, and to further complicate matters, these birds lost much of their usual wariness. Such a combination was bound to lead to concentrations of gunners in the area surrounding the Refuge and by 1939 the kill was greatly

exceeding what the flock could stand. Recognizing this, the Illinois State officials and the U.S. Fish and Wildlife Service initiated investigations designed to provide reliable information on which a long-term management program could be based. The authors and others who made the investigations not only found facts but faced them. They now tell of an appreciable gain in numbers of this flock due to increased protection and other management practices.

There is much interesting information in this report. For instance, the race *Branta canadensis interior* which breeds west, south, and east of James and Hudson Bays was found to be composed of four subgroups, each constituting a separate flyway population. Birds wintering in the Mississippi valley are believed to breed in the western limits of the Paleozoic Basin west of James Bay and the south coast of Hudson Bay. Habitats in these breeding grounds are described and well illustrated. Migration routes and wintering areas are outlined.

There also is information on productivity, behavior, hunting in Illinois, relative vulnerability of juveniles and adults to hunting, causes of death, sex ratios, and survival data.

The importance of bird banding as a prolific source of information not otherwise obtainable is once more demonstrated in this report and the authors obviously have put to good use data derived particularly from banding records of the Jack Miner Bird Sanctuary and the Horseshoe Lake Game Refuge. Although part of the information presented is, of necessity, of somewhat local interest, most of it is of much broader application and the report will be read with profit not only by ornithologists and conservationists at large, but as well by the few who still are skeptical of the efficiency of scientific methods as applied to wildlife management. — W. EARL GODFREY.

The Mammals of Waterton Lakes National Park. *By A. W. F. Banfield. Canadian Wildlife Service, Wildlife Management Bull., Ser. 1, No. 1, April, 1950, 43 pp., 10 figs.*

The annotated list (Section C) contains 42 species. Under Section A big game species including the elk, mule deer, moose, bighorn sheep, and mountain goat are treated in considerable detail with much useful information of a definite nature being given on their history in the Park, present distribution and numbers, sex ratios, ecology, food habits, and lethal factors. There is also useful information on the black and grizzly bears, coyote, badger, and beaver in this Park. The beaver is included under the heading 'Carnivores', obviously a *lapsus*. Section B is devoted to range studies in Waterton River Valley. Extensive clipping studies were made and quantitative and qualitative data are given, as well as descriptions of the natural ranges.

The introduction gives the seasonal duration of the investigation but the year in which this was conducted does not appear to be definitely indicated. Thus a sight record (p. 26) of two cougars "last year" and the fairly abundant status recorded from the snowshoe rabbit "during the present summer" (p. 38) lose some of their significance. The topography and characteristic vegetation cover of the area are described; there is an account of previous investigations there by others; and a bibliography is included. Maps are used to excellent advantage to show distributions of the more important mammals concerned. — W. EARL GODFREY.

The Birds and Mammals of the Creston Region, British Columbia. *By J. A. Munro. Occasional Papers of the British Columbia Provincial Museum, No. 8, August, 1950, 90 pp., 16 figs.*

This is another of Mr. Munro's excellent contributions to the natural history of western Canada. He tells us that parts of the region have been subject to profound environmental modification during the past 20 years, and that the purpose of the paper is to record the primitive characteristics of the region while remnants of them still remain for study, to note current conditions, and to discuss the bird and mammal populations as observed by him in 1947, 1948, and 1949.

The Creston region is defined and a detailed description (pp. 2-18), illustrated by 15 habitat photographs, is given. Topography, biotic zones, vegetation cover, changes in habitats, and wildlife food resources are dealt with, and there is an account of previous work in the area. The annotated list of birds (pp. 21-78), comprising 176 species and subspecies, contains information on local distribution, seasonal and numerical status, occasional notes on behaviour, and a considerable amount of information on food habits derived from stomach examinations. The annotated list of mammals (pp. 79-89) embraces 41 species and subspecies. In both the bird and mammal lists there are frequent

taxonomic notes based on examination of specimens taken in the region. — W. EARL GODFREY.

Studies in Bird Migration Being the Collected Papers of H. Chr. C. Mortensen, 1856-1921. *Edited by Paul Jespersen and A. Vedel Taning; Dansk Ornithologisk Forening; 1950, Ejnar Munksgaard, Copenhagen; pp. 1-272, photos and map. (Price, 18 Danish kr.).*

This is a memorial to the Dane, Hans Christian Cornelius Mortensen, and his work in pioneering modern systematic bird banding. In 1899 Mortensen began placing numbered bands on the legs of starlings and later, on a number of other bird species. The bulk of this volume is made up of nineteen of Mortensen's articles originally written in mainly Danish and here readably translated into English by H. M. Kyle. These usually informal and discursive articles give us a picture of the early development of modern methods of capturing and banding wild birds and illustrate Mortensen's meticulous care in compiling and interpreting the data derived from banding. There is a short biography of Mortensen and a list of 30 papers and books written by him. — W. EARL GODFREY.

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SHORE BIRD MIGRATION AT MONTREAL[1]

LEWIS MCI. TERRILL
Montreal, Quebec

THE south shore of the St. Lawrence River between St. Lambert and Laprairie Creek (Rivière St. Jacques), near Laprairie, is by far the best place in the vicinity of Montreal for migrant shore birds. This four-mile stretch of shore is now a part of Ile au Heron Bird Sanctuary, a federal sanctuary established in 1937.

Several sections of the shore, especially at the mouth of Laprairie Creek, are marshy with a growth of willows, sedges, rushes and other moisture-loving plants such as cat-tail *(Typha)*, water-parsnip *(Sium)* and bur-reed *(Sparganium)*. In the wet silt and shallow water extensive beds of two tall grasses *(Spartina* and *Elymus)* are giving way to two attractive invaders, the Purple Loosestrife *(Lythrum salicaria)* and Flowering Rush *(Butomus umbellatus)*. Although the loosestrife has been established here for many years, Laprairie, according Marie-Victorin (1935), appears to have been the birthplace in America of the globe-trotting butomus. In any event, though widely distributed in the east, it was not listed in earlier works on American plants.

While certain shore birds such as Wilson's Snipe, Greater and Lesser Yellow-Legs and Solitary Sandpiper, are sometimes found in the marshy areas the chief haunt of most species is the two-mile stretch of open shore commonly known as Laprairie Beach where many of the observations in the following list were made. The stony beach for the most part has a sparse and inconspicuous growth, principally Silver-weed *(Potentilla anserina)* in the drier parts and water-plantain *(Alisma)* and arrow-head *(Sagittaria)* in the wet silt. In some places there are also patches of polygonum and bur-marigold (*Bidens*). A comparatively recent and unwelcome addition to the beach flora is the clotbur *(Xanthium)*.

Much of the grassy vegetation, or 'common', subtending the beach is close-grazed by herds of cows. Here plover commonly gather and, except in very dry weather, some sandpipers, particularly Least and Semipalmated, are often found.

The discontinuance of spring shooting and, subsequently, enactment of the Migratory Birds Convention Act and the full protection of all shore birds except the Woodcock and Wilson's Snipe have, naturally, brought about a notable increase. Griscom (1945) states that after twenty-five years of protection it is possible to see more species of shore birds and more individuals in one day on the coast of Massachusetts than could be seen in a decade of constant field experience in his youth. This is indeed a remarkable achievement, but we can scarcely claim such an increase in the Montreal district.

Formerly there were relatively few observers and records available for comparison prior to the adoption of the above-mentioned protective measures are proportionately scarce. Wintle in "The Birds of Montreal", published in 1896, includes a briefly annotated list of shore birds observed in the district by himself and others during the fifteen years preceeding 1896. Many of the records were made on the south shore between Longueuil and Laprairie which then, too, was considered the most favourable place for plovers and sandpipers, but except for such generalities as "common", "scarce", or "rare", there is often very little that could be used as a satisfactory basis for comparison with the present status of the various species. There are no specific records in Wintle's list for several of them, such as Long-billed, Eskimo and Hudsonian Curlews, and the Knot. These are included on the evidence of birds exposed for sale in the Montreal markets and said to have been shot near Montreal by market hunters. Of the thirty

[1] Received for publication April 17, 1951.

Vol. 65, March-April, 1951, was issued June 23, 1951.

species mentioned fourteen are listed as common, fifteen as scarce or rare, and one, European Woodcock, as accidental.

The present list is compiled from my own records covering approximately the past forty-five years, with which are incorporated many observations contributed by others, chiefly members of The Province of Quebec Society for the Protection of Birds. Included in the list are four species listed by Wintle which have not since been recorded: European Woodcock, Long-billed Curlew, Eskimo Curlew and Buff-breasted Sandpiper. Of the thirty-two species enumerated eighteen occur here fairly regularly but only sixteen can be considered at all common.

The White-rumped Sandpiper has been classed with the common species chiefly on the evidence of observations prior to 1937. The scarcity and irregular occurrence of this sandpiper in recent years coincides with the higher water levels in late summer and autumn which have been progressively higher since 1936. In 1943 the river level was reputedly the highest in forty-three years. In my opinion it was even higher in 1945. There was practically no beach and the only feeding place for many species, especially in dry weather, was the actual water line. Compare this with conditions prevailing prior to 1937 when the water was generally very low in the fall — so low at times that ships were forced to reduce their cargoes and harbour officials were considering plans for dredging the channel. On portions of Laprairie Beach it was often possible to walk out on the exposed mud flats for about half a mile. These mud flats, dotted with pools of water, provided excellent feeding places for many birds. Early in the season great numbers of Savannah Sparrows and, later, Horned Larks, Pipits, Snow Buntings and sometimes Lapland Longspurs intermingled with shore birds. These were the favoured haunts of the White-rumped Sandpiper and possibly the changed conditions are responsible for their scarcity.

While most shore birds have been somewhat scarcer since high water levels prevailed, many water birds have been observed in greater numbers, particularly in the shallow bay on the south shore of the sanctuary. Here we often see from 2,000 to 5,000 dabbling ducks, principally Pintails and Black Ducks, and Blue and Green-winged Teals, with smaller numbers of several other species. Most diving ducks, such as Scaup and Goldeneye, congregate in rafts in deeper water well out in the river, often a mile or more from shore.

Amongst the more interesting birds noted in the Sanctuary were ten Whistling Swans on November 18/19, 1940; and several Harlequin Ducks in November, 1945. Brant have been far more common latterly and for a number of years we have had non-breeding Double-crested Cormorants and Black-backed Gulls from early spring until late fall. An occasional Holboell's Grebe is seen but in 1950 more than usual were reported.

One of the effects of the deepening of the ship channel some years ago was lowered water levels on the south shore between St. Lambert and Longueuil. As a result the bed of the river was exposed in many spots between St. Helen's Island and St. Lambert, and numerous islets appeared. This area has become a favoured rendezvous of gulls in the fall. These are chiefly Herring and Ring-billed, but latterly there are usually a considerable number of immature Blackbacks and smaller numbers of Glaucous and Iceland Gulls. In late November and early December, 1950 there was a pronounced invasion of Brünnich's Murres, many being found dead or in a dying condition, as was the case during the last big invasion here in 1932.

The principal purpose of the following list is to give some idea of the time of occurrence and relative abundance of shore birds at Montreal, particularly the more regular transients. If all museums and published records had been thoroughly searched it is probable that other species might have been added.

Piping Plover.

Charadrius melodus. Apparently unrecorded in the immediate vicinity of Montreal. In fact the only record for the district is of one shot September 17, 1916 near Nicolet on Lake St. Peter. I saw this in the flesh in the shop of Dumouchel Bros., taxidermists, in Montreal. I do not know what became of this specimen and am unable to say whether it was referable to the coastal race *(C.m.melodus)* or to the inland Belted Piping Plover *(C.m.circumcinctus),* recently reinstated.

Semipalmated Plover.

Charadrius hiaticula semipalmatus. Transient. Occurs irregularly in very small num-

bers in spring; regular fall transient and usually fairly common. Average spring arrival (8 years), May 24; earliest, May 13 (1944); latest, June 3 (1949). Average departure (8 years), May 31; earliest, May 18 (1936); latest, June 13 (1949). Average fall arrival (37 years), Aug. 13; earliest, July 22 (1942 & 1948); latest, Sept. 23 (1906). Average departure (37 years), Sept. 25; earliest, Aug. 3 (1925); latest, Nov. 11 (1935).

Although one of the most regular of shore bird visitors during the fall migration it is seldom seen in large numbers. A few sometimes appear in late July, but the height of the southward movement is in late August or early September. Peak numbers (75-100) were recorded on the following dates: Sept. 12, 1920; Aug. 20, 1931; Aug. 31 and Sept. 15, 1935. A few are frequently found throughout October and occasionally into November.

Killdeer.

Charadrius vociferus vociferus. Summer resident. Common and well distributed in fields and open pastures almost throughout the district. Average spring arrival (46 years), March 31; earliest, March 13 (1946); latest, April 23 (1911). Average fall departure (40 years), Oct. 15; earliest, Sept. 17 (1911); latest, Nov. 20 (1938).

Killdeer are returning earlier than formerly as the average earliest date for the past ten years (March 22) indicates. As a rule they do not become generally distributed on their nesting grounds until the end of the month or early April. In the fall the bulk have usually departed by mid-September.

Wintle (1896) lists the Killdeer as a common summer resident but his only specific reference to nesting is that "some years ago they were found breeding at Lachine". He adds that "this plover would breed plentifully if not shot off in the spring".

Doubtless the protection afforded the Killdeer by the discontinuance of spring shooting and, later, by the passing of the Migratory Birds Convention Act and the protection at all seasons of this species and most other shore birds, was largely responsible for its present abundance. In my own experience a few pairs were to be found on Ile Jésus, adjacent to Montreal Island, during the years 1905-1909, but the first actual nesting was recorded in 1910. Since then it has increased rapidly, many nests being found each year.

In the spring I seldom see Killdeer in flocks, generally singly, in pairs or small groups on the nesting grounds. In the fall, however, it often assembles in considerable numbers, particularly where grasshoppers and crickets, the principal food at this season, are abundant. Peak numbers noted were 200 on Sept. 6, 1914; about 100, Oct. 3, 1931 and Aug. 12, 1934; 200-300 from Aug. 17 to Sept. 22, 1935; 250, Aug. 9, 1936; 160, Sept. 22, 1940; and 200, Sept. 21, 1941. Apparently somewhat less common from 1942 to 1950, only two concentrations of 100 or more being recorded. These were an estimated 250 on Sept. 7, 1948, in the extensive mud flats created by railway development at Sortin; and about 100, Aug. 27, 1949, along the Basin of the Richelieu at Chambly.

American Golden Plover.

Pluvialis dominica dominica. Transient. No spring records and usually scarce in the fall. Average fall arrival (27 years), Sept. 11; earliest, July 20 (1934); latest, Nov. 1 (1931). Average departure (27 years), Sept. 23; earliest, July 26 (1916); latest, Nov. 11 (1935).

This is by far the rarest of the four species of plover which occur here at all regularly. Although recorded nearly every year singles or couples are the rule, often in the company of Black-bellied Plover. Although many of the latter transients are in partial nuptial plumage, nearly all Golden Plover seen here, at least in recent years, have been birds of the year or adults in winter plumage. Wintle (1896), however, who lists the Golden Plover as a common fall transient, states "most of this species shot here early in the season have blackish patches on the underparts".

Peak years were: 1911, Oct. 15 (20); 1915, Sept. 12 (50); 1927, Sept. 22 (40); 1931, Nov. 1 (9); 1934, Oct. 8 (15); 1935, Sept. 21 (12); 1942, Oct. 17 (35); 1944, Oct. 1 (21).

Black-bellied Plover.

Squatarola squatarola. Transient, scarce in spring; usually fairly common and sometimes abundant in fall. Average spring arrival (6 years), May 29; earliest, May 16 (1937); latest, June 16 (1948). Average departure (6 years), June 2; earliest, May 16 (1937); latest, June 16 (1948). Average fall arrival (33 years), Sept. 4; earliest, Aug. 3 (1947); latest, Oct. 30 (1932). Average departure (33 years), Oct. 18; earliest, Aug. 17 (1927, 1947); latest, Nov. 19 (1944).

This plover was especially numerous during the years 1935-1938, as the following comparative dates for peak numbers indicate; Oct. 21, 1919 (21); Aug. 23, 1923 (40); Oct. 14, 1933 (40); Sept. 21 to Oct. 20, 1935 (150-200); Oct. 12, 1936 (75); Oct. 23, 1937 (100); Sept. 25, 1938 (250); Oct. 14, 1941 (60); Oct. 4, 1942 (15); Sept. 6, 1943 (18); Sept. 30, 1944 (115); Oct. 20, 1945 (30); Oct. 20, 1946 (12); Aug. 17, 1947 (27); Sept. 25, 1948 (10); Oct. 1, 1949 (8); Oct. 21, 1950 (9). These peak numbers are all for the south shore of Ile au Heron Sanctuary (Laprairie Beach). In 1940, however, they appeared to be more common on Lake St. Peter; also in that year a very large flight was reported at Verdun on Sept. 24.

Spring transients seen May 16-21 were in winter plumage but two on May 25 had black breasts. August birds are mainly adults in summer (nuptial) plumage and many of those occurring here in the first two weeks of September have some black on the underparts. October and November birds are always in winter plumage.

Ruddy Turnstone.

Arenaria interpres morinella. Transient. Two in nuptial plumage on June 7, 1950, is the only spring record. Frequently occurs in fall but in very small numbers. Average fall arrival (15 years), Aug. 27; earliest, Aug. 4 (1950); latest, Sept. 15 (1935). Average departure (15 years), Sept. 11; earliest, Aug. 19 (1917); latest, Oct. 19 (1940).

Turnstones are generally observed singly or in couples, although on a few occasions as many as six have been recorded. Ten on September 21, 1935, one of the peak years locally for shore birds, is the largest number recorded. Although adults, still in partial summer plumage, may be seen along the Lower St. Lawrence in July, most fall birds seen here are young, or adults in the more sober fall dress.

American Woodcock.

Philohela minor. Summer resident. Common in suitable localities throughout. Less numerous in heavily timbered areas. Average spring arrival (35 years), April 2; earliest, March 17 (1943 & 1946); latest, April 19 (1914). Average fall departure (42 years), Nov. 1; earliest, Oct. 9 (1938); latest, Nov. 28 (1915).

The Woodcock usually arrives here a little later than the Killdeer and often remains somewhat later in the fall. Normally well distributed in the Montreal district, it nests rather commonly in favourable habitats, though Wintle lists it as a "scarce summer resident" prior to 1896. As is the case with most birds their numbers fluctuate from year to year. For instance they were less common in 1940 and 1941, moderately common in 1942, and in 1943 had almost reached normal abundance. In the years 1944 to 1946 their numbers had again fallen but since then there has been considerable improvement, more being noted in the nesting seasons of 1949 and 1950 than for some years. My conclusions are based mainly on a comparison of actual counts of nests and singing birds made in certain localities from year to year. Wintle's belief that Woodcock were scarce summer residents and more common in the fall may have been partly the result of a more diligent searching of their covers in the fall hunting season, during the migratory flights of more northern birds.

The average date of the first Woodcock observed here during the past ten years (March 23) doubtless gives a more accurate idea for recent years. Either Woodcock are returning earlier, or some of the earlier dates, when there were fewer observers, are not fully representative. Occasionally nesting starts in March but many birds do not arrive until the first week of April or even later, and nests are more commonly found during the latter half of that month.

European Woodcock.

Scolopax rusticola. Accidental visitant. One shot at Chambly, November 11, 1882, is the only record for the district and, in fact, for the Province. This occurrence is recorded by Wintle (1896) and is amongst the very few North American records listed by Bent (1927).

Wilson's Snipe.

Capella gallinago delicata. Summer resident and transient. A rather uncommon breeder though fairly common in some years in a few favourable localities. Formerly a common to abundant transient in spring and fall, but, latterly, since at least 1939, much less common, being exceptionally scarce in the years 1941-1947. A slight increase was noted in 1948-1950. Average spring arrival (42 years), April 16; earliest, March 27 (1938); latest, April 30 (1916). Average departure (36 years), Oct. 18; earliest, Sept. 12 (1915 & 1941); latest, Nov. 19 (1933).

Normally, snipe are widely distributed in spring but in the fall are more likely to be found concentrated in favourable feeding places. In April, when snipe are moving north, there are many surface ponds whose oozy borders provide a plentiful supply of food, whereas, during the height of the southward movement in late September and early October, the fields are mostly dry and the ponds empty. At this season they are more common along water-courses. A few are often seen in the sedgy portions of the St. Lawrence in Ile au Heron Sanctuary.

For a number of years a certain willow bog on the south shore, near St. Lambert, provided an excellent index to the local abundance or scarcity of snipe in the autumn. It was always a comparatively simple matter to count the birds as they habitually congregated about the muddy margin of a small pond in the centre of the bog, where I have sometimes seen upwards of forty bunched closely together in flight from the margin. A comparison of peak numbers seen there from 1933 to 1945 gives some idea of their scarcity latterly: Oct. 3, 1933 (23); Sept. 23, 1934 (43); Sept. 24, 1935 (23); Sept. 13, 1936 (34); Oct. 2, 1937 (18); Sept. 29, 1938 (2). During succeeding years often none at all were seen, the largest number being four on September 12, 1941. Decrease in the local breeding population is less noticeable.

Long-billed Curlew.

Numenius americanus. Wintle lists this curlew as a rare transient, apparently on the evidence of birds seen in the Montreal markets in August and September. He adds that "a few were shot in this district at that time of the year and exposed for sale in our markets". This is, at best, rather unsatisfactory evidence as he states that he saw no curlews whatever in life, also that in several instances western game birds seen in Montreal markets were shipped here from Chicago and other mid-western points. I know of no later records.

Hudsonian Curlew.

Numenius hudsonicus. Scarce fall transient; no spring records. Average fall arrival (6 years), Sept. 7; earliest Aug. 20, (1918); latest, Sept. 23 (1932). Average departure (6 years), Sept. 9; earliest, Aug. 20 (1918); latest, Sept. 24 (1944).

Although this curlew is observed rather frequently in small flocks on the St. Lawrence River east of Quebec, their numbers and frequency of occurrence dwindle rapidly further inland. I have the following records for the Montreal district: Sept. 17, 1916 — one shot on Lake St. Peter; Aug. 20, 1916 — one shot on Nun's Island, Montreal. I saw these birds, either newly mounted or in the flesh, at Dumouchel Bros. Sept. 23, 1939 — one shot on Lake St. Peter (Brown). I also have well-authenticated sight records for Laprairie Beach: Aug. 23, 1932 (2), Mousley & Wynne-Edwards; Sept. 6, 1942 (1), Hollom & Wynne-Edwards; Sept. 17, 1944 (1), Montgomery; and for Hudson, Sept. 24, 1944 (1), G. G. Ommanney.

Eskimo Curlew.

Numenius borealis. I have no information on the former occurrence here of this Curlew, now believed extinct, other than Wintle's statement that it was a scarce transient prior to 1896. The only supporting evidence submitted is "occasionally shot in the autumn on Lake St. Peter . . . A few were shot the latter end of August and in September, 1893, and exposed for sale in our markets". We have no later records.

Upland Plover.

Bartramia longicauda. A rather scarce transient and scarce summer resident. Average spring arrival (9 years), May 3; earliest, April 9 (1916); latest, May 29 (1946). Average fall departure (5 years), Aug. 25; earliest Aug. 6 (1949); latest, Sept. 27 (1941).

My introduction to this *sandpiper,* which we formerly knew as the Bartramian Sandpiper and which yet may be given the more appropriate name, Upland Sandpiper, was in Ontario, near the Quebec border, where I saw at least eight pairs in four miles of grassy upland between Morrisburg and Iroquois. This was on May 23, 1909. I have not since seen as many in one day. A few nest in the Montreal district — Côte St. Luc for instance, where one and sometimes two pairs have been noted repeatedly for a number of years. A brood of young was seen there on July 10, 1942 (Brown).

There is some evidence locally that transient Upland Plovers are increasing. Four on August 8, 1943 and seven on September 3, 1944 are the largest numbers ever reported from Laprairie Beach. As usual with fall birds they were very wild, flying for several hundred yards, usually at considerable elevation. Closing their wings at the end of the

flight they would swoop falcon-like to the ground, raising their wings in the manner of Yellow-legs and other tattlers as they alighted. They would then stand very erect, emphasizing the unusual proportions for a sandpiper — long neck, small head and short plover-like bill, which greatly facilitated identification, even at a distance.

Spotted Sandpiper.

Actitis macularia. Abundant summer resident and transient. Average spring arrival (46 years), May 7; earliest, April 20 (1941); latest, May 17 (1897). Average fall departure (46 years), Sept. 14; earliest, Aug. 15 (1932); latest, Oct. 15 (1905).

Fluctuation in numbers, for one reason or another, is usual with most birds, but the Spotted Sandpiper probably varies less in this respect than most shore birds. At no season are they found here in compact flocks. At most you will see two or three, or perhaps as many as five or six, teetering on a rock or stranded log. A few arrive quite early in May, or sometimes even in late April. Some of the later birds are probably transients, but I am unable to give any data on the transient movement in spring.

The Spotted Sandpiper nests commonly in fields and pastures, usually near water of some sort, either pond, stream, or marsh. In such inland habitats each pair has quite an extensive territory, but along the shores of the larger rivers, such as the St. Lawrence, they are more abundant and nest closer together on the river banks, especially when these are too steep to invite the pedestrian. The greatest concentrations in the nesting season, however, are to be found on certain small islands in the St. Lawrence. Here, in some cases, they are actually gregarious, often nesting a few feet apart in the manner of terns. On June 1, 1946, I estimated there were about a hundred pairs on Ile au Heron, Goat Island and adjacent small islands at the foot of Lachine Rapids. Again, on June 26, 1950, there were over 50 pairs nesting with Common Terns on two grassy islands off the south shore at Côte Ste. Catherine. The densest concentration of nesting birds in my experience was observed on Ile Ronde below St. Helen's Island in 1896 and again in 1898. On May 31 of the latter year there were upwards of a hundred pairs on this small island of a few acres, and in a short time I found about twenty-five occupied nests.

There are no four-footed animals on these smaller islets, with the possible exception of an occasional muskrat or mink, and humans rarely visit them in early summer which doubtless accounts for their popularity with the sandpipers. On the Lower St. Lawrence, where the shores are periodically washed by heavy surfs, this sandpiper has truly earned the soubriquet 'fly-up-the-creek' by nesting on the gravel beds of streams deep in the forest and often many miles from the coast.

It is probably this ready adaptability to environment coupled with the normally non-gregarious habits of the Spotted Sandpiper that have made it one of nature's outstanding successes. We always have Spotted Sandpipers — that is, in season. They go south rather early. Although I have seen an adult with a downy chick as late as August 10, nesting is usually over early in July when birds that have nested inland join those along the river shores. It is thus difficult to determine what proportion of the fluctuating numbers on the shore are transients from northern areas. Immature birds, often in considerable numbers, continue to frequent the river shores throughout August and a few remain into September and sometimes even October, but adults are always scarce in these months.

Eastern Solitary Sandpiper.

Tringa solitaria solitaria. Transient. Fairly common in some years, rather scarce in others; somewhat more common in the fall. Average spring arrival (24 years), May 13; earliest, May 3 (1942, 1948); latest, May 27 (1917). Average departure (24 years), May 22; earliest, May 9 (1945); latest, June 3 (1947). Average fall arrival (34 years), Aug. 8; earliest, July 10 (1921); latest, Sept. 2 (1919). Average departure (34 years), Sept. 15; earliest, Aug. 16 (1925); latest, Oct. 23 (1932).

Solitary Sandpipers although of regular occurrence here in migration, never congregate in the manner of many other shore birds. In fact they seldom visit the open river shore but prefer the seclusion of inland bogs, quiet back-waters, or the banks of small streams or ponds. Singles or couples are the rule but occasionally in the fall several may be found in close proximity where food is plentiful; for instance, some open waste land with pools of water adjacent to a willow bog near St. Lambert, where snipe habi-

tually collected. Here I have seen more Solitary Sandpipers at one time than elsewhere. They were especially numerous in the years 1930-1938 when I frequently saw from eight to twelve, and on two occasions, August 30, 1933, and September 5, 1934, from fifteen to twenty. Eight near Philipsburg on May 15, 1949 is the largest concentration recorded in the spring. But these are exceptional numbers. Usually one would require to explore many miles of suitable territory to see as many.

Solitary Sandpipers were unusually scarce in 1942, slightly more common in 1943, and again scarce in 1944 and 1945.

Greater Yellow-legs.

Totanus melanoleucus. Transient. Probably a regular migrant in spring in very small numbers, but none recorded in some seasons; more common in the fall; one summer record. Average spring arrival (20 years), May 12; earliest, April 25 (1915); latest, May 29 (1921). Average departure (20 years), May 19; earliest, April 25 (1915); latest, June 17 (1917). Average fall arrival (37 years), Sept. 6; earliest, July 25 (1942); latest, Nov. 3 (1907). Average departure (37 years), Oct. 14; earliest, Aug. 16 (1925); latest, Nov. 20 (1949).

Spring transients occur singly as a rule and are usually seen in flooded inland fields. Four, April 25, 1915; four, May 13, 1926; and six on May 9, 1939 are the largest numbers recorded at this season. One, seen June 17, 1917, several miles inland from the river at Laprairie, was not found on a subsequent visit and I concluded that it was a late transient.

Although of regular occurrence in the fall we seldom see flocks of any size such as are found on the Lower St. Lawrence. At this season, when inland fields and surface ponds are mostly dry, they are generally found on river shores. Singles and couples are still most frequent, often with Lesser Yellow-legs, but sometimes groups of from three to eight are noted. They are more common in September and October. Sixteen on October 23, 1937 is the largest number recorded here in one day.

Lesser Yellow-legs.

Totanus flavipes. Seldom observed in spring, but a regular and common fall transient. Average spring arrival (6 years), May 24; earliest, May 17 (1947); latest, June 2 (1946). Average departure (6 years), May 25; earliest, May 19 (1944); latest, June 3 (1946). Average fall arrival (33 years), Aug. 8; earliest, July 14 (1936 and 1950); latest, Sept. 7 (1908). Average departure (33 years), Sept. 21; earliest, Aug. 18 (1912); latest, Oct. 25 (1942).

The few spring records are for singles or couples with exception of three on May 24, 1926. This scarcity in spring is general throughout eastern Canada as they mostly follow the Mississippi to their northern nesting grounds.

Wintle lists the Lesser Yellow-legs as a scarce transient. He gives no fall records and only one for the spring, a male shot at Laprairie, June 1, 1889. What a remarkable change since his time! From 1919 to the present I have seen them in the fall in every year but one (1925). Peak years, when twenty-five or more were recorded in a single day, were 1923, 1935, 1936, 1940, 1944, 1945, and 1947 to 1950. The largest number was upwards of 100 on August 15, 1936, one of the big years for most shore birds when, as already mentioned, water levels on the south shore were at their lowest.

The Lesser Yellow-legs occurs most commonly in August although often seen in smaller numbers throughout September, and a few even into October. Fall birds nearly always arrive earlier than the Greater Yellow-legs and they leave earlier. While they commonly frequent the open river shore, it is not unusual to find a few about inland ponds, associating with Solitary, Least, and Spotted Sandpipers.

American Knot.

Calidris canutus rufa. Transient. Very scarce in spring; somewhat more frequent in fall. Only two spring records; one, May 24, 1926, in nuptial plumage with a group of shore birds, including Least Sandpipers and both Yellow-legs, on the margin of an inland surface pond near St. Hubert (Terrill); and two, also in summer plumage, on Laprairie Beach, May 31, 1947 (Montgomery). Average fall arrival (6 years), Sept. 8; earliest, Aug. 15 (1920); latest, Oct. 21 (1917). Average departure (6 years), Sept. 9; earliest, Aug. 15 (1920); latest, Oct. 21 (1917).

Four Knots, the largest number for a single day, were seen Aug. 27, 1949 on Laprairie Beach (Montgomery). As many as three, however, were recorded in the same locality on the following dates: Aug. 15, 1920 (with

Lesser Yellow-legs); Sept. 8, 1928; Sept. 7, 1940 (Terrill); and Aug. 31, 1949 (Montgomery). One, the latest (seasonal) record, was secured from a flock of Black-bellied Plover on Oct. 21, 1917, near St. Antoine (Verchères Co.), about twenty-five miles below Montreal (Terrill).

Purple Sandpiper.

Erolia maritima. Very rare transient. I have only one record — two examined in a bag of shore birds seized by game inspectors. These were shot Oct. 9, 1921 at Cartierville, on Rivière des Prairies (Montreal Island). Wintle (1896) states several were shot "a few years ago" on Nun's Island, at the foot of Lachine Rapids by Mr. George Costen.

Pectoral Sandpiper.

Erolia melanotos. Transient. Very scarce in spring but a regular and frequently common fall transient. Average spring arrival (3 years), May 24; earliest, May 18 (1946); latest, May 28 (1947). Average departure (3 years), May 27; earliest, May 26 (1946); latest, May 28 (1947). Average fall arrival (29 years), Sept. 1; earliest, July 18 (1942); latest, Oct. 13 (1929). Average departure (29 years), Oct. 2; earliest, Sept. 1 (1921); latest, Oct. 29 (1949).

The Pectoral Sandpiper follows the Mississippi Valley on its way north; hence the scarcity here, as elsewhere in eastern Canada at that season. Although of fairly regular occurrence in the fall, in some years it is markedly scarce. Specimens secured from flocks observed Sept. 20 and Oct. 18, 1908, near Ste. Geneviève, on Rivière des Prairies (Montreal Island) constitute my first records. From 1908 to 1920 there are a few scattered records, but since 1920 they have been observed in nearly every year. Peak numbers were 75-100 on Oct. 6-8, 1933; and 50-200, Sept. 11-22, 1934. However, these were exceptional years. It is more usual latterly to see less than twenty and often only two or three.

Pectorals are often found in inland fields and pastures. In the Laprairie Beach area they commonly frequent the grassy foreshore, often with Killdeer and Least and Semipalmated Sandpipers. In very dry weather, however, they are more frequently found on the river margin where they commonly associate with Red-backs.

White-rumped Sandpiper.

Erolia fuscicollis. Transient. Very scarce in spring; more regular and formerly common in fall. Only two spring records; June 5, 1942 and May 27, 1948, both singles seen on Laprairie Beach. Average fall arrival (18 years), Sept. 24; earliest, Aug. 11 (1950); latest, Oct. 30 (1937). Average departure (18 years) , Oct. 13; earliest, Aug. 22 (1942); latest, Nov. 22 (1931).

Like many shore birds this species migrates to its northern nesting grounds by an interior route. On the return journey to its winter quarters it occurs here more regularly, although noted infrequently and in very small numbers since 1937. Prior to that year, however, it occurred more regularly and more commonly, especially during the years 1931-1936, either in exclusive, compact flocks, or in the company of Sanderlings or Red-backed Sandpipers, feeding on the extensive mud flats exposed by low water levels prevailing in those years. It is generally one of the latest shore birds to arrive and one of the last to leave. Peak numbers recorded were: Oct. 18, 1931 (22); Oct. 29, 1933 (175); Oct. 20, 1934 (30); Oct. 20, 1935 (75); Oct. 12, 1936 (24). Latterly we consider ourselves fortunate if we see one or two.

The White-rumped Sandpiper is usually unsuspicious and permits a close approach. Single birds or small groups occasionally linger into November, often in association with Sanderlings or Red-backs. This companionship is sometimes very marked; although flushed repeatedly they continue to pitch together, or seek each other's company after alighting.

Baird's Sandpiper.

Erolia bairdii. Transient. No spring records; rare fall migrant. Average fall arrival (8 years), Aug. 15; earliest, Aug. 4 (1942); latest, Sept. 11 (1943). Average departure (8 years), Sept. 17; earliest, Aug. 14 (1939); latest, Nov. 10 (1950).

Wintle's sole record of Baird's Sandpiper is one in the company of Semipalmated Sandpipers, shot September 17, 1892 on Laprairie Beach, where all other records were also obtained. I first recognized this sandpiper on September 11, 1927, when I saw two amongst other shore birds shot on the Beach and seized by game inspectors. It was next reported on August 14, 1939, when three were seen (D. M. Scott). This is the largest number ever reported here. The earliest

seasonal date, August 4, 1942 (Hollom & Terrill), and the latest, November 10, 1950 (Sait & Terrill) were both singles. There were more records in 1949 than any other year — one with Semipalmated Sandpipers, August 13 (Montgomery); two with Semipalmated Sandpipers and Semipalmated Plovers, September 18 and one with three Pectorals and a Semipalmated Sandpiper, October 29 (Terrill).

This species is notably one of the most difficult of shore birds to identify in the field, especially when the bird is alone. Fortunately Baird's is an unsuspicious and patient bird and often permits of close and extended scrutiny without showing much alarm. In fact it is this rather sedate, unhurried attitude that sometimes leads one to suspect its identity and to look more closely for other field marks, in particular the extensive buffy suffusion on the breast, the distinctly outlined whitish margins of the back feathers, etc. The presence of other small shore birds, such as the Semipalmated Sandpiper, for direct dimensional comparison, naturally lessens the eye strain.

The November 10 record was exceptionally late. This bird was alone, feeding actively during a gusty inshore wind and apparently loth to take wing, permitting us to examine it at leisure within a few feet.

Least Sandpiper.

Erolia minutilla. Transient. Fairly common in spring; usually more common in fall. Average spring arrival (20 years), May 20; earliest, May 13 (1944); latest, May 29 (1935). Average departure (20 years), May 24; earliest, May 15 (1932); latest, June 10 (1933). Average fall arrival (38 years), Aug. 4; earliest, July 14 (1936 and 1950); latest, Sept. 4 (1921 and 1922). Average departure (38 years), Sept. 15; earliest, Aug. 12 (1911); latest, Nov. 5 (1932).

The average return and departure of this species in the fall might be more correctly reflected in averages for the past fifteen years which are respectively July 30 and September 20, a difference of five days in each case. Although some birds are apparently returning earlier and leaving later than formerly, it is difficult to determine whether this is the case with the Least Sandpiper. The disparity may be partly the result of the greater number of observations latterly.

In spring the Least Sandpiper commonly frequents inland surface ponds and in some years relatively few are found on the river shores. As there is an abundance of moisture almost throughout at this season it is inclined to feed in small groups. Along the St. Lawrence it is seldom seen at the river's edge but frequents the foreshore or 'common' above the beach where we have occasionally seen between 75 and 150. Peak years were 1942-1944.

A few Leasts appear in July but they are more numerous in August and sometimes early September. In direct contrast to their habit during the spring migration, fall birds are seldom found in inland fields, doubtless because of the lack of moisture, but frequent the shore and, in wet weather, the 'common'. Here they usually associate with Semipalmated Sandpipers. Although it is sometimes difficult to get accurate estimates, I am confident that the Least is more numerous in the spring than any other sandpiper, with the possible exception of the Spotted, and generally much less common than the Semipalmated in the fall. Compare the largest fall estimates: 300 in 1928, 150 in 1942-1943, and 125 in 1950, with a peak of 2,500 Semipalmated in 1935.

Red-backed Sandpiper.

Erolia alpina pacifica. Transient. Scarce and irregular in spring but a regular and often common fall migrant. Average spring arrival (6 years), May 26; earliest, May 11 (1946); latest, June 9 (1947). Average departure (6 years), May 31; earliest, May 21 (1942 and 1949); latest, June 15 (1950). Average fall arrival (22 years), Sept. 4; earliest, July 29 (1945); latest, Oct. 26 (1930). Average departure (22 years), Nov.1; earliest, Oct. 3 (1931); latest, Nov. 26 (1944).

The Red-back arrives later in the fall than most other shore birds and is one of the last to leave. Apparently its status has not changed much since Wintle's list was published in 1896, as he lists it as scarce in spring and plentiful in October and November. Latterly October is the peak month, although a few often remain into November.

Most Red-backs seen here are young birds or adults in fall plumage, with monotone, dark gray backs, but an occasional early migrant, in July or August, still has some of the reddish back and black belly of the adult nuptial plumage. They have a penchant for mud flats and often wade in shallow

water where they feed somewhat in the manner of dowitchers and godwits, driving their rather long bills rapidly into the ooze. Peak numbers were seen in the years when low water levels provided extensive mud flats: Oct. 14-22, 1933 (75-100); Oct. 13-27, 1935 (100); Sept. 19, 1936 (100); Oct. 23, 1937 (83); and Oct. 30, 1937 (60). Since then, during the prevailing high water levels, it has been usual to see less than twenty, seventy-five on Sept. 29, 1940 being the largest count for one day.

Red-backs are voracious feeders. Although Pectorals, Sanderlings, Yellow-legs and others are frequent associates, the Red-backs, usually singles or small groups, always appear to be engrossed in probing the muddy shallows and wholly indifferent to their companions. Once (Nov. 15, 1936) I saw one with a flock of Snow Buntings, the only other birds on the beach.

Dowitcher.

Limnodromus griseus. Transient. No spring records; scarce and irregular fall migrant. Average fall arrival (8 years), Aug. 28; earliest, Aug. 15 (1933); latest, Oct. 9 (1938). Average departure (8 years), Sept. 5; earliest, Aug. 20 (1931); latest, Oct. 9 (1938).

Probably Dowitchers occurring here belong to the eastern race, *Limnodromus g. griseus,* but I have seen no specimens taken locally and am placing it under the specific name.

Wintle lists the Dowitcher as a transient visitant and states that it is rare near Montreal but that it occurs more commonly on the Richelieu near St. Johns; also that specimens were received from St. Johns by Charles E. Craig, formerly a taxidermist in Montreal.

Dowitchers are still scarce here. The largest numbers seen, all on Laprairie Beach, were ten on Aug. 26, 1934; and five on Aug. 23 and Aug. 31, 1949.

Semipalmated Sandpiper.

Ereunetes pusillus. Transient. Irregular and usually rather uncommon in spring; common to abundant in the fall. Average spring arrival (11 years), May 26; earliest, May 18 (1936 and 1946); latest, June 7 (1950). Average departure (11 years), June 1; earliest, May 18 (1936); latest, June 15 (1950). Average fall arrival (38 years), Aug. 11; earliest, July 10 (1942); latest, Sept. 29 (1912). Average departure (38 years), Sept. 25; earliest, Aug. 24 (1913); latest, Nov. 1 (1936).

Possibly this sandpiper occurs here more regularly in spring than the relatively few records indicate as the river shores have been explored less thoroughly at that season than in the fall. Thirty-five on May 28 and thirty on May 31, 1947 are the largest counts. From fifteen to twenty have been seen on a few occasions but otherwise from one to ten has been the rule. In spring it occurs less regularly and usually in smaller numbers than the Least Sandpiper.

Fall records, on the other hand, indicate that the Semipalmated almost always greatly exceeds the Least and all other shore birds. A number usually arrive in the latter part of July but it is most abundant in August. Peak numbers were: upwards of 200 on Sept. 7, 1908, and Aug. 5, 1917; 400, Aug. 6, 1927; 2500, Aug. 31, 1935; 2000, Aug. 9, 1936; 150, Aug. 7, 1938; 350, July 30, 1944; 500, Aug. 19, 1945; 150, Sept. 6, 1947; 150, Aug. 15, 1948; and 225-300, Aug. 4-13, 1950. Counts of several hundreds made in some of the earlier years are not included for the reason that no special effort was made to estimate proportions of Least and Semipalmated. This is by no means always an easy matter, especially when the birds are constantly shifting their position. When together, however, I find the darker, browner backs of the Leasts a good contrast to the lighter, grayer Semipalmated. The legs are not always clearly visible, and sometimes the greenish legs of the Least become soiled and darkened through contact with oozy mud.

During the years 1939-1943 there was a pronounced falling off in numbers. This corresponded with prevailing high water, but apparently the relative scarcity was not entirely due to reduced feeding grounds as they became much more common in 1944-1945 when water levels were at their highest. Latterly the Semipalmated has not been observed in flocks as commonly as during low water levels, generally being found singly or in small groups, scattered along the water's edge. Each bird appeared to have a definite feeding area and would often rush forward belligerently to attack an intruder, even one as large as Red-backed or Pectoral Sandpipers.

Buff-breasted Sandpiper.

Tryngites subruficollis. This sandpiper is listed by Wintle as a "transient visitant,

scarce. Mr. (Paul) Keutzing (taxidermist) has observed this species during the month of May at Longueuil". We have no later records.

Marbled Godwit.

Limosa fedoa. Transient or accidental visitant: rare.

There are only two recent local records: one seen on Laprairie Beach, May 15, 1932 (Wynne-Edwards); and one at Chambly Canton, July 24, 1949 (G. E. Hibbard). The latter bird was watched for some time at close range as it fed on the stony shore of an island in the Basin of the Richelieu River. The very long, upturned bill, large size and lack of white on the upper tail coverts when it flew, were clearly noted.

Wintle gives an undated record of one shot in the spring on Lake St. Peter and received by the late Mr. F. B. Caulfield, Montreal taxidermist, but the only Quebec specimens I know of at present are one shot near Metis, Matane County, on August 25, 1919 and forwarded to me in the flesh by Mr. Napier Smith, which is now in the Redpath Museum of McGill University; also another shot August 31, 1933 at Rivière Ouelle, Kamouraska County, and secured by Abbé René Tanguay for the Museum at Ste. Anne de la Pocatière College.

Hudsonian Godwit.

Limosa haemastica. Scarce fall transient.

The only definite record listed by Wintle is of one shot Sept. 2, 1890 on Laprairie Common by Mr. Archibald Inglis. Since then I have the following records: a female shot near Montreal on Nov. 4, 1917 and now in the Redpath Museum; a flock of seven on Laprairie Beach, Oct. 8, 1933 (Terrill); one on Nun's Island, opposite Verdun, Aug. 29, 1943 (D. Ryan); two on Laprairie Beach, Oct. 8, 1943 (Terrill); one on Nun's Island, Aug. 27, 1944 (D. Ryan); and one on Laprairie Beach, Oct. 1, 1949 (Montgomery and Terrill).

The couple seen on October 8 were watched for more than an hour. They were rather wild at first and flew frequently, but by careful and persistent stalking we managed to get within thirty feet of them and even took photographs as they fed in shallow water just offshore, driving their long bills rapidly into the ooze without raising them above the surface of the water. If alarmed at our near approach they raised their bills, stood at attention a few moments and emitted a low-voiced 'peep, peep' before taking flight. They always alighted in water, stretching their wings overhead in the manner of Yellow-legs and certain other shore birds. If the water was over their depth they would swim towards shore until it was about breast-high, when they would commence feeding. Very shallow water was also avoided, the conclusion being that the food they sought was more abundant in deeper water and that the depth at which they fed was only limited by the length of their bills and legs.

These recent occurrences suggest that this rare shore bird, rare even in Audubon's time, may be increasing.

Sanderling.

Crocethia alba. Transient. Very scarce in spring but a fairly regular and not uncommon fall migrant in some years. Average fall arrival (17 years), Sept. 18; earliest, Aug. 17 (1924); latest, Nov. 14 (1937). Average departure (17 years), Oct. 14; earliest, Sept. 1 (1920); latest, Nov. 18 (1950).

Wintle lists the Sanderling as a common transient, but only cites three records. Strangely enough two were spring birds: a male shot at Laprairie, May 24, 1888, and another seen there, June 1, 1889, the only spring records known to me.

Until 1936 it was usual to see only one or two Sanderlings and occasionally as many as four or five. Latterly they have been more common and are apparently increasing. Peak years were: 1941 (Nov. 9), 8; 1944 (Sept. 10), 30; 1945 (Sept. 24), 12; and 1949 (Oct. 1), 8. The Sanderling is one of our latest shore birds. The majority are seen in September and October, but there are a number of November records. Most of those seen here are young in fall plumage with mottled backs.

Red Phalarope.

Phalaropus fulicarius. Transient, or accidental visitant. No spring record. Five fall records: a male shot at Longue Pointe, Oct. 7, 1916; one shot at Valleyfield, Sept. 23, 1917; one shot at Valleyfield and another on Lake St. Francis, Oct. 7, 1917. These were all examined in the flesh in the shop of Dumouchel Bros., taxidermists, in Montreal. The fifth record was a male found by the writer on December 2, 1917, in an emaciated and dying condition, its feet frozen in the

ice in a ditch at Brosseau, a mile or so from Laprairie Beach. This bird was preserved and is now in the Redpath Museum at McGill University.

The rarity of this Phalarope in inland districts, and the fact that all but one of the records are for the fall of 1917, suggests the possibility of an invasion of storm-driven birds in that season, but a search of The Auk and other literature reveals only a single record for that year — an adult male in winter plumage taken at Disraeli, Wolfe County, Que., on September 21, 1917 (Auk, 1927, 221).

Northern Phalarope.

Lobipes lobatus. Transient. No spring record; rather uncommon fall migrant. Average fall arrival (10 years), Aug. 23; earliest, Aug. 6 (1938); latest, Sept. 24 (1927). Average departure (10 years), Sept. 6; earliest, Aug. 6, (1938); latest, Oct. 27 (1940).

The Northern Phalarope is the only member of this pelagic family to occur here at all frequently. Most of our records are for August, with a few for September and still fewer for October. Those observed here are mainly singles, couples or small groups up to seven. I have only one record for a larger number, sixteen off Laprairie Beach on August 26, 1944. They were feeding actively in weedy patches a short distance from shore and were rather restless, moving frequently but always alighting in water over their depth. One became separated, swimming to the shore and finally climbing onto a sand spit where it became engrossed in catching small shad flies, frequently flying up and getting them in the air in legitimate flycatcher fashion. It seemed most incongruous for this graceful swimmer to use its lobed feet to climb boulders in search of flies. These flies were very abundant. Even Killdeer and Lesser Yellow-legs were making short flights in pursuit of them.

An analysis of the evidence indicates that there has been a pronounced increase in the numbers of the following species since Wintle's list was published: Killdeer, American Woodcock, Lesser Yellow-legs and Semipalmated Sandpiper. The increase in the Lesser Yellow-legs is especially noteworthy as is the transition of the breeding status of the Killdeer and Woodcock from scarce to common, or even abundant. Less pronounced increases are also apparent for Black-bellied Plover, Ruddy Turnstone, Upland Plover, Solitary Sandpiper, Least Sandpiper (spring), Baird's Sandpiper, Red-backed Sandpiper, Hudsonian Godwit, Sanderling, and Northern Phalarope. On the other hand there has been a definite decrease in the numbers of Golden Plover and, in recent years, Wilson's Snipe and White-rumped Sandpiper.

I wish to thank members of The Province of Quebec Society for the Protection of Birds and others who have contributed notes on shore birds, many of which appear in the migration tables and annotated lists of the Society's Annual Reports (1935-1949) which have been used extensively in this summary. I am particularly indebted to the following whose observations cover a considerable period or who have been especially active in recording shore bird movements on Laprairie Beach for shorter periods: W. J. Brown, J. D. Cleghorn, J. B. Gollop, W. W. H. Gunn, P. A. D. Hollom, H. A. C. Jackson, I. McLaren, G. H. Montgomery Jr., W. H. Mousley, A. C. Nicol, C. C. Sait, F. N. Smith, and V. C. Wynne-Edwards. The names of some of these appear in the text in abbreviated form. Lastly my special thanks are due to my wife who has assisted me in field work for many years and has helped in the preparation of this report.

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THE RING-BILLED GULL AT OTTAWA, ONTARIO, AND ITS FIELD RECOGNITION [1]

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THE DESCRIPTION by Lloyd (1944) of the ring-billed gull, *Larus delawarensis*, as a rare transient at Ottawa, Ont., scarcely does justice to its regular occurrence, particularly in fall. Prior to 1946 I kept no special watch for this species, although a few were seen with herring gulls, *L. argentatus smithsonianus*, at Dow's Lake in the fall of 1945. From 1946 onward, with increased practice at distinguishing these two species at a distance, the ring-billed gull has been recorded in considerable numbers. It seems safe to say that in the areas where most of my observations have been made, i.e. Dow's Lake, the fields of the Central Experimental Farm, and the south shore of Lake Deschênes, the fall population of ring-billed gulls is about 10% that of herring gulls. Both species are markedly less abundant in spring and no estimate of the ratio has been made, but it is perhaps approximately the same as in fall. Counts of ring-billed gulls made from birds at a distance, or from large flocks moving erratically, have been made by picking out definite birds of that species and assuming the rest to be herring gulls. Such counts must generally have been too low, especially when 200 or more birds have been scattered over a field.

Spring observations include 6 immature birds on May 25, 1947 (with W. Earl Godfrey) and 5 adults on May 14, 1949. Many presumptive herring gulls seen in spring have been far from shore on the Ottawa River; some of these may well have been ring-billed gulls.

In the fall of 1946, up to 10 ring-billed gulls were seen simultaneously at Dow's Lake with herring gulls, chiefly in late September and early October. In 1947, 1 to 15 birds were seen on 16 days between Sept. 21 and Nov. 12. In 1948, when more time was devoted to this species, it was noted on 71 out of 113 days on which any gulls were seen between Aug. 1 and Dec. 6. The greatest number seen was a flock of 21 immature birds at Lake Deschênes on Sept. 12, but 8 to 15 were often seen in a day up to early November. In August and early September they were most numerous on the L. Deschênes shore where they generally outnumbered herring gulls; later, perhaps because of the onset of fall ploughing, this area was largely abandoned. Only a few scattered bird observations could be made in the fall of 1949, but about 35 ring-billed gulls were seen at Dow's L. on Oct. 3, about 10 on Oct. 5, and a few on other dates.

In 1950 the early fall migration was again missed and a change of residence precluded daily observation of ploughed fields at the Central Expuerimental Farm. One to eleven were seen on 13 days at Dow's L. in the ratio of about 60% first year, 25% second year and 15% adult birds. Records by age groups were not kept before 1950, but first-year birds have always predominated. The greatest number of adults definitely seen simultaneously in any fall has been three. Adults are positively distinguishable at much shorter distances than immature birds and counts for them therefore tend to be too low. Counts for herring gulls at Dow's L. in the same period gave 19% first year, 8% second year,

[1] Received for publication November 28, 1950.

6% third year and 67% adult birds; but it should be noted that advanced third-year birds will pass as adults unless the bill colour or tail marks are visible, and that some birds counted as second-year may have been retarded third-year birds. These age analyses have generally been confined to periods when the gulls were lined up on the canal boom. In late fall, after the canal has been drained, the gulls are generally dispersed about the lake and exact counts are impossible.

In contrast to the herring gulls, most of which spend the night at the west end of L. Deschênes, the ring-billed gulls in fall seem usually to spend the night near Britannia. A visit to Britannia pier just before sunset on Oct. 21, 1950, revealed at least 42 of the latter species on the water.

Little is known of the turnover of birds throughout the fall, but a few observations of lame or otherwise distinguishable birds suggest that many stay only a few days.

Since the apparent scarcity of the ring-billed gull must be due to its confusion with the herring gull I shall attempt to analyze the resemblances and differences. The main distinctions between the adults are well known — the greenish yellow feet and black bill ring of the ring-billed gull and the flesh feet and red bill spot of the herring gull. As Peterson (1947) has observed, the ring-billed gull usually shows more black in the primaries; but there is great variation, as the illustrations of Dwight (1925) show, and I have found the point of limited value. The sharp, black tail-band of the immature ring-billed gull is usually an excellent mark. Size is valuable when the birds are all at the same distance from the observer. The manner of flight is not a positive diagnostic character, but may draw attention to birds that deserve scrutiny. The rate of wing beat is somewhat faster in the ring-billed gull in dead air, but it is so much lighter than the herring gull that if there is any turbulence the beat becomes slow and shallow. Its flight is graceful and buoyant and it can soar in up-drafts that require a herring gull to flap continuously. Distinctions of voice, suggested by some observers, are of limited value. The commonest cry of the ring-billed gull may be rendered as *kee-air* and is usually higher pitched than the corresponding *kee-ow* of the herring gull; but the latter often gives the high-pitched cry and both species have great vocal ranges.

The problem in distinction is between first-year ring-billed and second-year herring gull, between second-year ring-billed and third-year herring gull, and between the two adults. These age groups are compared in Table 1. A few points concerning the table should be explained. First, it must be emphasized that age determinations, especially in the field, cannot always be exact. There are some herring gulls that resemble second-year birds in colour but have quite sharp tail bands. These I have arbitrarily treated as second-year, but many, at least, may well be retarded third-year birds. Poor (1946) has recently summarized extensive observations on plumage and colour of colour-banded herring gulls of known age. His results indicate that, although Dwight's descriptions fit the average for each group well, there is more extensive variation of several characters than was hitherto realized. For the field observer perhaps his most important finding is that the rectrices of third-year birds are occasionally all brown or all white, although usually with a broad subterminal brown band, and that a little brown is occasionally present in those of fourth-year birds. Consequently we must regard the age groups as indicating the degree of maturity rather than the exact age.

Similarly a few ring-billed gulls might equally well be classed as advanced first-year or retarded second-year birds, by field examination. Natural variation, fading and abrasion of plumage, and the frequent prolongation of the post-juvenal or post-nuptial moults throughout the fall migration period all add to the difficulty. The table really is a comparison of birds having approximately the same colour.

Second, since this is a table of field marks, colours and other characters are given only as they appear in the field, not necessarily as they would appear on a specimen in hand.

The wing pattern of the first-year ring-billed gull often allows it to be picked out at distances up to half a mile on the wing. This pattern is approached, with less contrast, by some advanced or bleached second-year, or retarded third-year herring gulls; such birds also show a sharp tail band approaching the pattern of the ring-billed gull. I have generally classed these as second-year birds on the basis of general body colouration, but, to judge from Dwight's descriptions and

Table 1. — Field Marks of ring-billed and herring gulls

	1st yr. ring-billed gull	2nd (? and retarded 3rd) yr. herring gull	2nd yr. ring-billed gull	Advanced 3rd yr. herring gull	Adult ring-billed gull	Adult herring gull
Tail	Band sharp, narrow, uniform	Band broad and diffuse (to moderately sharp and narrow)	Band narrow, often incomplete	Band narrow, often incomplete.	White	White
Wing	Sharp, dark wedge of outer primaries contrasts with pale broad triangle of inner wing; narrow dark band near back edge	Light brown without definite pattern or approaching that of ring-bill with less contrast	Mantle brownish gray to gray; black wedge of outer primaries; trace of very small mirror	Mantle gray; black of primaries little more than in adult; one small mirror	*Usually* extensive black and small mirrors	*Usually* less black and larger mirrors
Bill	Proportionately 7% shallower; pale at base, outer 2/5 black	Proportionately 7% deeper; pale at base, outer ⅓ black	Proportionately 7% shallower; pale with dark subterminal band	Proportionately 7% deeper; pale with dark subterminal band	Proportionately 7% shallower; yellow with black ring near angle	Proportionately 7% deeper; yellow with red spot at angle
Eye	Looks big and black owing to large eye crescent, dark iris and fine bill	Looks smaller owing to small crescent, paler iris and heavy bill	Looks fairly big owing to slight eye crescent and fine bill	Looks normal size	Looks slightly large owing to fine bill	Looks normal size
Tarsus colour	Pale flesh or grayish	Flesh	Pale buff or yellowish	Flesh	Dull to bright yellow or greenish	Flesh
Track length	c. 48 mm.	c. 70 mm.	c. 50 mm.	Over 70 mm.	c. 51 mm.	c. 75 mm.

illustrations, it may well be that they are all in their third year.

The eye is one of the best marks of the first-year ring-billed gull. The slender bill, pronounced eye-crescent and dark iris combine to give the effect of a large black eye. The eye crescent is centered in front of the eye and spreads over and under it. It is illustrated by Dwight (*loc. cit.*) and is shown in a sketch by Taverner on file in the National Museum of Canada for a juvenal female (N.M.C. 15724) taken in Saskatchewan on July 16, 1920. It is apparently always large and dark in juvenal and first winter birds, but is faint in the second year. The second winter herring gull is illustrated by Dwight as having quite a definite eye crescent, but the crescent is not mentioned in the discussion of this plumage. In the field a slight impression of the eye crescent or of a line over the eye is sometimes to be had, but it is never conspicuous and the eye never appears unduly large.

The proportions of the bill depths are from Dwight's figures for *Larus delawarensis* and *L. argentatus smithsonianus,* calculated against average total length of the bird. Similar calculations show that in *L. delawarensis* bill length is equal, tarsus 10% longer, bent wing 10% longer, tail 8% longer, and toe 7% shorter in proportion. Apart from the bill these characters do not seem evident in the field, but it is probable that together they produce a definite, if intangible, effect upon the bird's appearance.

The tarsus of the ring-billed gull is so slender that its colour is not evident at great distances. Furthermore the colour is often dull and ill-defined. The colours given are therefore based on limited observations, but they agree fairly closely with those recorded by Dwight.

The track is often useful as a check on other means of distinction when birds are on sand or mud. The measurements are for the full length of the middle toe, as defined by Hickey (1943) for shore birds. They are based on limited measurements and so are subject to slight adjustment. It may be noted that the track of juvenal herring gulls about one week on the wing (Chesterfield Inlet, August, 1950) is 63-65 mm. There thus seems to be no possibility of overlap between the two species.

Acknowledgement is made to Mr. W. Earl Godfrey for advice and suggestions during this study and in the preparation of the report.

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NEW MINERAL OCCURRENCES FROM THE PROVINCE OF QUEBEC [1]

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FROM A COUNTRY so vast as Canada and with so great a diversity of rock formations the list of minerals recorded to date is expectably long. Information concerning the occurence of mineral species may be obtained directly from various published reports, or from the appropriate provincial Department of Mines or equivalent organization, or from the Minerals Files and Records branch of the Geological Survey of Canada. This information may be of great economic importance to prospectors, especially when the mineral sought, though perhaps itself rare, or occurring in particles too small to be easily seen, has well recognized associations with other and commoner minerals. Thus gold is often finely though rarely visibly disseminated through a vein of quartz, or it may occur as an invisible impurity in pyrite. Scores of such as-

1) Received for publication January 16, 1951.

sociations are welcome clues to the whereabouts of certain desired minerals.

The purpose of this short report is to place upon record the occurrence of two minerals not previously noted from the province of Quebec, and one which has been reported from but two localities. My thanks are due to my colleagues, Professors Graham and Riddell, for help in the technical work of identifying the various species.

1. Glockerite (hydrous iron sulphate). Bécancour Co., Quebec. The mineral occurs as a canary-yellow powder covering exposed surfaces and joint planes of an Ordovician black shale of Utica age along the south (left) bank of the Bécancour river about 3 miles (straight line) downstream from Daveluyville (Maddington Falls). The locality is within a few hundred feet of the St. Lawrence and Champlain fault, and on that account the shale is considerably fractured and contorted. Many of the nearby rocks carry pyrite concretions, and indeed the Utica shale itself in places contains pyrite. The glockerite is in all probability the result of the oxidation of this pyrite or some other iron sulphide mineral.

As far as I know this is the first recorded occurence of this mineral in Canada.

2. Melanterite (hydrous sulphate of iron). Same locality as for glockerite. This mineral rarely occurs in a natural state, but is usually the result of some interference by man with rocks containing iron sulphide minerals such as pyrite, marcasite, etc. In the present case no melanterite can be detected in the outcrop, but pieces of the black Utica shale, with or without a dusting of the yellow glockerite, produce the white (actually colorless) encrusting or disseminated mineral within a few months of exposure to the normal dampness of the atmosphere indoors, where protected against the dissolving action of natural moisture, dew, rain, etc. Some fifty pounds of this rock were collected for its graptolite fossils. After being stored for the winter months in the Redpath Museum, the formation and growth of melanterite crystals resulted in a splitting of the rock into thin laminae, in many cases a fraction of a millimeter thick. Upon being handled, this laminated product crumbles to powder at the touch. The white melanterite covers some of the outer surfaces as a fine acicular growth, without, however, showing any characteristic crystal form. Obviously the paleontological value of such transformed rocks is completely destroyed.

3. Vivianite (hydrous phosphate of iron). Post-glacial clays at Deschaillons, Lotbinière Co., Quebec. The mineral occurs as a clear blue powder, accompanying masses of fossil wood buried in a bed of rusty sand a few inches thick beneath a hundred feet or so of post-glacial clays. Other post-glacial clays underlie the horizon where the vivianite is found. It is said to occur independently of the pieces of fossilized wood. No obvious explanation for its localized formation comes to mind. Intimately associated with it is a grayish-yellow powder, concerning which Dr. Graham reports to me as follows:

"*Earthy yellowish-brown material* (occurs with vivianite).

"The material, with, it is believed, no admixed vivianite, gives reactions for phosphate, ferric iron, and water, and is thus a basic ferric phosphate.

"A number of basic ferric phosphates are known, most of them definite mineral species and more or less well crystallized. Of these, koninckite, $FePO_4.3H_2O$, or $Fe_2O_3.P_2O_5.6H_2O$, and cacoxenite, $2Fe_2O_3.P_2O_5.12H_2O$, are yellow or brownish-yellow, and dufrenite, $2Fe_2O_3.P_2O_5.3H_2O$ is green but turns yellow to brown on alteration.

"In addition, some ill-defined, amorphous basic ferric phosphates have been described and named. Two of these are *picite* and *delvauxite*. The latter has approximate composition $2Fe_2O_3.P_2O_5.24H_2O$ and has been referred to as 'a wet dufrenite'. Picite is similar, with less water. Both occur as brown to yellowish-brown coatings and have yellow streak.

"I would think your material is related to one or other of these amorphous 'minerals'."

Vivianite has already been reported from Stanstead and Vaudreuil counties in this province (Johnston, R. A., Geological Survey of Canada, Memoir 74, p. 234, 1915), in the first case from a bed of laminated clay, and in the second from a bed of bog iron ore.

From all three localities now known this mineral occurs in post-glacial deposits.

It is interesting to note that in marine sedimentary rocks the color of fossil inarticulate brachiopods, whose original shell was in most cases phosphatic, is blue. Possibly this is the result of a reaction involving iron in the sediment (or in the shell) and the phosphatic shell, producing vivianite.

THE ATHABASKA CANADA GOOSE ON THE NIAGARA RIVER [1]

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ON THE MORNING of March 16, 1950, Mr. A. R. Muma, Wildlife Conservation officer for Welland County, advised me that he had located on the River at Chippawa a flock of Geese comprising 23 Canada Geese, *Branta canadensis* subsp., which he believed to be Lesser Canada, and one adult Blue Goose, *Chen caerulescens*. A visit about noon, to the spot indicated, failed to reveal the geese which had apparently moved up the river. A message from Muma, in the evening, indicated that, in the late afternoon, a small group of geese had been seen far out in the river above Navy Island. However, a visit to the river at Chippawa, early in the morning of March 17, was entirely successful, and the flock of geese, as described by Muma, was found grazing on a small spit of snow free grass land which juts out into the bay formed by the filling in of the Hog Island channel, at a point that was formerly the mouth of the Welland River. When first seen, one sentinel goose was in the water, a short distance out from the grassy spit; the other 22, and the adult Blue Goose, were on land, the Blue Goose being farthest inland. The Bay was full of ducks, mostly Canvas-backs and Scaups, and all very wary. When approached, many of the ducks took flight, thereby disturbing the grazing geese which all slowly took to the water and floated out in a long line from the tip of the spit; but there they rested, apparently undisturbed further by the restless ducks, and I was afforded prolonged, and most excellent views, with ample opportunity to count heads over and over again.

There were 23 small Canada Geese, and one adult Blue Goose, in a closely knit group. The Blue Goose, while under observation, was always in very close association with the Canada Geese and apparently a recognized member of the group with some indication, by its constantly maintained position at the end of the line, that it might even be a leader. This close proximity of an undoubted adult Blue Goose afforded most fortuitous and excellent size comparison with which to judge the subspecific status of the small, lightish brown-backed, Canadas, the 23 individuals of which varied to some extent in size, although all were most certainly very much smaller than the common Canada that migrates through this area. The smallest individual in the flock was, to all appearances, scarcely larger than the Blue Goose, and none were much larger for whenever the Blue was looked for it had to be picked out by colour of plumage, or silhouette, from its close associates, and not by size, as would have been the case with a Common Canada and Blue association. These 23 geese in size closely resembled both the Lesser Canada Goose *B. c. leucopareia* and its interior pale representative the Athabaska Canada Goose, *B. c. parvipes*. However, because of their most noticeably pale, almost sandy brown coloured backs it would seem that they were best referable to the latter and that they, like their Blue associate, were migrating considerably off their normal course.

The above occurrence would seem of more than usual interest, and worthy of placing on record for when writing "Water Birds of the Niagara" (1945, Can. Field-Nat. 59, (5):151-169), I was unable to find a single authentic report of the appearance on the Niagara of this smaller race of Canada Goose, in all the accumulated historical data assembled on this particular group of water-fowl, at that time.

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SOME SUPPLEMENTARY BIRD NOTES FROM THE GENERAL AREA OF THE MACKENZIE DELTA AND GREAT SLAVE LAKE [1]

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IN 1943 an account of the birds of the Mackenzie Delta region was published by A. E. Porsild and some further notes on the birds of the area were published by C. H. D. Clarke (1944). Nevertheless, the observations of the present authors add a few species to the list and in other ways supplement the information already available in print. Miss D. L. Robinson has been in charge of the government school at Tuktoyaktuk (Port Brabant) since August 1947 and a list of spring arrival dates for two years at this point on the Arctic Coast, based entirely on her observations, is given in Table 1. Notes in the text based on her observations are indicated by the initials D.L.R., the rest being due to E. O. Höhn who was in the area from mid-June to Sept. 5, 1949, as a temporary medical officer for the Indian and Eskimo Health Services, stationed at Aklavik. As Porsild's paper gives the eskimo names of many species, eskimo names of a few not given by him are noted below. A few notes on species not seen by either of the authors and based on statements of local residents are included in square brackets. For a general description of the Mackenzie delta region the reader is referred to Porsild's paper. The notes from Great Slave Lake are from observations by E. O. Höhn who was in the district of Fort Resolution from May 20 to June 5, 1949, and at Fort Rae from June 5 to 12 of the same year. These notes are restricted to observations on two species not recorded in the previous literature (Preble 1908 and Fairbairn 1931) covering this area and to a few other species of special interest.

MACKENZIE DELTA

Red-throated Loon (*Gavia stellata*)

Distraction behaviour. A striking form of distraction display was seen on July 26, 1949, by one member of a pair on a small pool at the north end of Richard's Island. While the observer searched the shores of the pool for a nest which was not however found, the birds swam off stealthily towards the opposite shore. One of them then flew up and making straight for the intruder plunged straight under water from a height of about 6 feet, when a few yards away. The bird reappeared on the surface near its mate and again flew towards the observer but this time landed on the surface and swam off keeping the wing nearest the intruder half extended. On both flights the bird uttered a loud goose-like "ka ka ka kwaooo". Finally both birds took wing and left the pool.

Whistling Swan (*Cygnus columbianus*)

A downy young with its parents was seen on a lake near Kittigazuit July 29, 1949. None was seen during the period June-early September, 1949, in the numerous lakes of the Mackenzie delta proper.

[**Ross Goose** (*Chen rossi*)

An eskimo patient had seen one recently shot on Banks Island in May 1947. This man had worked with an American ornithologist for one breeding season who had told him of the existence of a smaller "wavey". The report is of interest as it suggests the possibility that small numbers of this species may nest in this area.]

[**Blue Snow Goose** (*Chen caerulescens*) Eskimo: *ganguk igalik* (goose blue fox).

According to several natives who have visited Bank's Island a few individuals of this species nest there among large numbers of lesser snow geese. Similar reports were made independently to Mr. J. Dewey Soper.]

Green-Winged Teal (*Anas carolinensis*) Eskimo: *sawelik aaluk*

Shoveller (*Spatula clypeata*)

Eight still in nearly full plumage were seen near Aklavik July 6, 1949.

Canvas-Back (*Aythya valisineria*) Eskimo: *taktuk*

A flock of about 30 on the East Channel on August 17, 1949, are an addition to Porsild's record for a single bird of this species.

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Red-tailed Hawk (*Buteo jamaicensis*)
This species is not listed in previous publications on the area. One was seen near Aklavik on July 13, 1949.

Golden Eagle (*Aquila chrysaetos canadensis*)
The species was still well represented in 1949. On August 17 while ascending the East Channel by boat, 4 pairs were seen within five hours. Single birds were also seen at the north end of Richard's Island and at Anderson River. Mr. M. McNab in charge of the Anderson River reindeer herd believes a pair nests regularly on the cape-like hill over the east bank of the river near its mouth.

Peregrine Falcon (*Falco peregrinus*)
On July 7, 1949, a nest with two downy young was found on a near vertical shale bank about 120 feet above the Arctic Red River near the settlement of that name. Both adults were present. This species is not listed by Porsild but as Arctic Red River is only 15 miles south of the delta proper and Clarke found it common further north and east on Coronation Gulf, its range no doubt includes the delta.

Pigeon Hawk (*Falco columbarius*) Eskimo: *kigiaverak* (small hawk)
As this species is not listed by Porsild, one seen near Aklavik on July 22, 1949 may be noted; this bird was also seen by Mr. J. Dewey Soper. Another, of which however only a fleeting view was obtained, was seen at Kittigazuit on July 29, 1949.

[**Sharp-tailed Grouse** (*Pedioecetes phasianellus*)
This species which does not appear in Porsild's list is found, according to natives, about Fort McPherson.]

Little Brown Crane (*Grus canadensis*)
Since Porsild notes that this species has not been observed in the delta during fall migration, three flying south over Aklavik on Aug. 18, 1949 may be noted.

Ruddy Turnstone (*Arenaria interpres*)
One observed on June 13, 1949 at Tuktoyaktuk may be added to the few records of this species given by Porsild. D.L.R.

White-Rumped Sandpiper (*Erolia fuscicollis*)
An individual of this species not previously recorded for the area was seen at Tuktoyaktuk on Aug. 2, 1949. (The following details were noted: the bird was appreciably larger than nearby Semi-palmated Sandpipers, even grey above, paler beneath. The bill was dark and quite straight. An unsuccessful attempt to collect it was made. On flushing the bird showed a well-defined white rump but no marked wing pattern. The observer is familiar with the Curlew Sandpipers and convinced this bird was not of that species. In view of the definite white rump, no other identification seems possible.)

Baird's Sandpiper (*Erolia bairdii*)
Since Porsild reports that this species has not been seen in the wooded part of the delta two seen near Aklavik (one of which was collected) on Aug. 20, 1949, may be noted.

Stilt Sandpiper (*Micropalama himantopus*)
Several seen at Tuktoyaktuk on Aug. 3, 1949, are an addition to the single record in Porsild's paper for the same locality.

Buff-Breasted Sandpiper (*Tryngites subruficollis*)
As previous publications on the area give only one record for this species the following may be added both from the north end of Richard's Island in 1949: two on July 26 and on August 19, a party of 5.

Sabine's Gull (*Xema sabini*)
One was seen at Tuktoyaktuk on June 13, 1949. D.L.R.

Northern Cliff Swallow (*Petrochelidon pyrrhonota*)
Porsild reports never having seen this species nesting on buildings anywhere in the delta. In the summer of 1949 there were, however, about 200 pairs nesting under eaves of houses and sheds in Aklavik. Twenty-one of these were banded on July 24 and 25. The mean weight of 15 adults, weighed before banding, on these dates was 26.2 grams with maxima and minima of 27.5 and 23.5 grams.

Canada Jay (*Perisoreus canadensis*)
One observed at Tuktoyaktuk on June 8, 1948, is of interest as this locality is about 40 miles beyond the tree line. D.L.R.

American Robin (*Turdus migratorius*)
The following records from points beyond the tree line are noteworthy; a pair at Kittigazuit July 29, 1949. E.O.H. At Tuktoyaktuk a pair used to nest regularly in a warehouse until disturbed in 1947. In the summer of 1948 only one was seen in this locality and no nest was found. In the summer of 1949 none were seen in Tuktoyaktuk but natives reported robins seen at camps 20-30 miles away. D.L.R.

Table 1.—Dates of Spring Arrival of Certain Species at Tuktoyaktuk as Observed by D.L.R.

Pacific Loon	'48	June 3
	'49	June 5
Whistling Swan	'48	May 9
	'49	May 11
Canada Goose	'48	end of May
	'49	early June
Black Brant	'48	May 15
	'49	May 30
White-fronted Goose	'48	May 10
	'49	May 13
Lesser Snow Goose	'48	May 10
	'49	May 27
Pintail	'48	May 16
	'49	May 26
Pacific Eider	'49	June 15
White-Winger Scoter	'48	June 15
Little Brown Crane	'48	May 6
	'49	May 8
Semipalmated Plover	'48	May 15
	'49	May 21
Golden Plover	'49	June 1
Semipalmated Sandpiper	'49	May 31
	'48	May 25
Northern Phalarope	'48	June 11
	'49	June 15
Parasitic Jaeger	'48	June 14
	'49	June 8
Glaucous Gull	'48	May 12
	'49	May 17
Arctic Tern	'48	May 30
	'49	June 5
Northern Raven	'48	May 12
	'49	April 25
Robin	'48	May 27
Savannah Sparrow	'48	June 1
	'49	June 9
Gambel's Sparrow	'49	June 7
Lapland Longspur	'48	May 12
	'49	May 27
Snow Bunting	'48	April 15
	'49	March 23 but disappeared again until mid April

Pine Grosbeak (*Pinicola enucleator*)
Since the status of this species in summer is not too clear from Porsild's observations several birds seen near Aklavik on July 12 and 16 may be noted.

Savannah Sparrow (*Passerculus sandwichensis*)
Porsild only refers to this species as having been found on the East Branch and on the Peel. It appears, however, to breed well beyond the tree line as several were seen at the north end of Richard's Island on July 26, 1949, one of which was collected. It was also seen at Kittigazuit on July 30, 1949. E.O.H. At Tuktoyaktuk it was seen in the summers of both 1948 and 1949. D.L.R.

Gambel's White-Crowned Sparrow (*Zonotrichia leucophrys gambelii*)
It was seen at Tuktoyaktuk on June 7, 1949. D.L.R.

GREAT SLAVE LAKE

Ross' Goose (*Chen rossi*)
Two were seen in the Slave River Delta on May 22, 1949. The male was shot; it weighed 3 lbs. 2 ozs. and the testes measured only 7 x 3 mm.

Osprey (*Pandion haliaetus carolinensis*)
As there are a few records of the Osprey for this area one seen at the mouth of the Little Buffalo River on June 1, 1949, may be noted. Though known to the natives here the species appeared to be unknown to all residents of Fort Rae with whom it was discussed.

Ruddy Turnstone (*Arenaria interpres*)
On was seen at Ft. Resolution on May 27, 1949. Another at the mouth of the Little Buffalo River on June 1, 1949, and another on June 6, 1949, at Ft. Rae.

Knot (*Calidris canutus rufus*)
There is no previous record of this species for Great Slake Lake. Preble dealing with the whole of the Mackenzie-Athabaska regions refers to it only in quoting Sabine in the appendix to Parry's first voyage 1824, who reported it as nesting in great abundance in the "North Georgia" Islands. A flock of eight all in full breeding plumage were seen at the mouth of the Little Buffalo on June 1, 1949. The observer is familiar with the species from experience in England.

Least Sandpiper (*Erolia minutilla*)
One was seen at Ft. Rae on June 8, 1949, in company with several Western Sandpipers.

Western Sandpiper (*Ereunetes mauri*)
This species does not appear in the lists of Preble or Fairbairn. In 1949, however, it was seen in some numbers about Ft. Resolution on May 26 and 27, also at the mouth of the Little Buffalo on May 29 and at Fort Rae on June 8. One was collected on May 27 at Resolution (and although the skin perished

while it was sent to Edmonton in a semi-prepared condition, careful comparisons with the descriptions given in Taverner's Birds of Canada and Peterson's Field Guide, were made on the spot).

Hudsonian Godwit (*Limosa haemastica*)

On May 26, 4 were seen at Ft. Resolution. Two were still in winter plumage, one in intermediate and one in full breeding plumage. The last, a male, was collected, the testes were 12 x 3 mm. in size.

Northern Phalarope (*Lobipes lobatus*)

Resting on Ice: Bent's Life Histories of N. American Shore Birds and the Handbook of British Birds (2nd. Ed., 1943) do not mention perching on ice in this species. It is therefore noteworthy [2] that on June 2, 1949, several northern phalaropes were perched on the edge of the lake ice at the mouth of the Little Buffalo river. One of them was shot on the ice. As the observer was unaware at the time of anything unusual about the observation no further observations were made. He has also seen a Greater Yellow-Legs (*Totanus melanoleucus*) resting on the ice edge of an Alberta lakelet in October. Resting on ice is quite probably frequent with many northern waders in spring. Since it is common in ducks and gulls it may be assumed that the skin of birds' feet, whether feathered or not, is an adequate heat insulator and that resting on ice does not present any particular physiological problem.

Short-billed Gull (*Larus canus brachyrhynchus*)

On June 1, 1949, a party of 8 were seen descending the Little Buffalo.

[American Magpie (*Pica pica hudsonia*)

This species, formerly unknown in the area, is in recent years, according to residents, seen regularly in the fall about Ft. Resolution. It appears to be slowly spreading northward in this region; at the time of Preble's report (1908), Ft. Murray was its northern limit, Soper (1942) records it as a new arrival in the southern extremity of Wood Buffalo Park, while it now appears to have reached the south shore of Great Slave Lake at least as a regular straggler.]

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[2] It would seem more remarkable if phalaropes did not rest on ice at least occasionally. Baird, Brewer, and Ridgway (The Water Birds of North America, Vol. 1, p. 334) speak of this species alighting on drift ice. A photograph (Condor, 1925, p. 233) shows a Red Phalarope standing on apparently either snow or ice. Dr. D. B. O. Savile tells me that several times in spring, 1950, at Chesterfield Inlet he saw Northen Phalaropes resting on ice. — Ornithology Ed.

NOTES AND OBSERVATIONS

A New Snake Record for Nova Scotia, *Thamnophis sauritus sauritus,* Linnaeus:— During the summer of 1950, a herpetological survey of Nova Scotia was conducted by the Nova Scotia Museum of Science in cooperation with Dr. D. J. McCallion of the Biology Department of Acadia University. In the course of this work, four specimens of the Eastern Ribbon Snake, *Thamnophis sauritus sauritus,* were collected in the Lake Kejimkujik area. One of these was a male and the other three were gravid females.

On the morning of July 12, while we were looking for frogs at a bog pond near Kempt, Queens County, a black and yellow striped snake was seen disappearing into an old beaver house. We returned in the afternoon and caught a female (26¼") and a male (23½") Eastern Ribbon Snake. At our approach the female moved towards the beaver

house, and the male entered the water. He swam with about three inches of his neck above the water. Later the same day, at Caledonia, while exploring the shore near a saw-dust pile, we found another female that measured 25¾". The third female was taken from the beaver house at Kempt on July 20.

When seen in the field, the Eastern Ribbon Snake is at once recognized by the three wide yellow stripes, one mid-dorsal, and one on each side. The absence of spots, its slimness, and the contrasts of the white upper labials against the dark head also help to distinguish it from the Common Garter Snake, *Thamnophis sirtalis sirtalis.*

According to Schmidt and Davis (1941), and Pope (1946) the range of the Eastern Ribbon Snake extends northward to southern Maine. Cox (1898) did not report its occurrence in New Brunswick. In Nova Scotia it was found only in the southern part of the province. This condition of an isolated population suggests that the Eastern Ribbon Snake occurs in southern Nova Scotia as a relic species from the last mild period, some 3,000-5,000-years ago.

References: Schmidt, K. P. and D. D. Davis, 1941. Field Book of Snakes. G. P. Putnam's Sons, New York. Pope, C. H., 1946. Snakes Alive and How They Live. Viking Press, New York.—*SHERMAN BLEAKNEY, Department of Biology, Acadia University, Wolfville, N.S.*

The Cougar in Manitoba. — No definite record of the cougar in Manitoba appears to have been established. In one of his publications, E. T. Seton refers to a few reports of cougar having been killed, but there appears to be no final proof to date.

During the last thirty years, I have had about six sight records within the Province. Near the northerly foot of Turtle Mountain, a farmer apparently saw two cougars leap a fence in the open some fifteen years ago. One was reported, a few years later, as seen by several people near Carman and a drawing of the pug-mark was given to the Museum; it has all the appearances of belonging to a cougar. Pug-marks were apparently seen in wet mud in the spring about five years ago by the Gebauer brothers about nine miles northwest of Morris. Other reports were less definite.

Last autumn a trapper in the Sprague district reported seeing a huge cat cross a township line; it was reported elsewhere in the same general district. Recently (March, 1951) a trapper informed a Conservation Officer that a strange animal had broken a lock snare he set for a wolf, leaving signs of blood and a violent struggle. He followed the tracks but soon lost them in the snow. The Officer is now trying to find the remains and send us the skull. The trapper thought it must have been the cougar which entered his snare.

A specimen in the Regina Museum was killed near Yorkton a few years ago.—*L. T. S. NORRIS-ELYE, Manitoba Museum, Winnipeg, Man.*

The Bay Lynx in Manitoba. — Up to the present time, there does not appear to have been any record (even a sight record) of the Bay Lynx *(Lynx rufus)* in Manitoba. Specimens have been reported as having been taken at Minaki and near Dryden in Ontario and also in Minnesota and North Dakota.

For six years I have sought the co-operation of the Provincial Game and Forestry Departments to look out for specimens in south-eastern Manitoba; I also alerted trappers in the same district.

The Director of Game and Fisheries, G. W. Malaher, through his conservation Officers, J. E. Harrison and D. J. McIntosh, received reports of a few Bay Lynx and instructed Steve Venus, a trapper, to try to secure a specimen. On March 16, 1951, Venus trapped a sub-adult female near a creek leading out of Mud Lake (Section 35 - 2 - 15 E.P.M.) and delivered it to J. E. Harrison. Instructions have been given to deliver any other specimens that may be trapped in future. It was brought to the Museum on March 29, when it weighed 9 lbs, 10 ozs. The measurements were T. l. 27¼: T.v. 4¾; H.f. 6 (all in inches).

On skinning it, porcupine quills were found in the left fore and hind feet and one had penetrated the soft palate and had reached the rear of the left eye-socket; all punctures had caused severe suppurations.

I asked the Conservation Officer to inquire from local residents when these animals were first noted; they stated that they first arrived eight years ago. There is a muskeg where the animal was taken and it harbours several varying hares; it is said that there are a few more Bay Lynx in this muskeg.

Local trappers have caught a few Bay Lynx in traps set for weasels, but they did not realize the significance of these catches and did not report them. — *L. T. S. NORRIS-ELYE, Manitoba Museum, Winnipeg, Man.*

On Local Records of *Empidonax virescens* and *E. traillii*.—Saunders and Dale ("History and List of Birds of Middlesex County, Ontario", Trans. Roy. Can. Inst., **19**: 210) record the Acadian Flycatcher, *Empidonax virescens*, as having been taken by A. A. Wood on May 26, 1921, at Coldstream, Ontario. The specimen on which this record was based, now in the Royal Ontario Museum of Zoology, proves to be Traill's Flycatcher, *Empidonax traillii*. The dorsal colour is characteristically warm green, the upper mandible is black and the wing is somewhat rounded (when folded, 15 mm. from the tip of the longest secondary to the tip of the longest primary). The "first" (10th) primary is shorter than the "fifth" (6th) and the "second and third" (8th and 9th) are about equal.

With further reference to the records of Saunders and Dale, they also report another occurrence of *E. virescens*, a bird "found" southeast of Newbury, Ontario. It is not stated whether this bird was heard, seen, or both. It is now conceded by many good field observers that the vocal utterances of *E. traillii* are deceptively variable, and its voice may or may not be diagnostic. The song of individuals of certain populations may even be confused with *E. virescens* especially in the lower Great Lakes region (western New York, northern Ohio, southern Ontario). This may throw some doubt on the record mentioned above. However, it is now clear that *E. virescens* does occur in Middlesex County. Specimen No. 22,4,20,400 in the Royal Ontario Museum of Zoology collection, taken at London, Ontario, on May 28, 1891, by J. A. Morden, is of this species and displays the peculiar cold green, dorsal colour characteristic of *E. virescens*, the horn brown upper mandible and the pointed wing (when folded, 19 mm. from the tip of the longest secondary to the tip of the longest primary). The "first" (10th) primary is longer than the "fifth" (6th) and the "third" (8th) is the longest.

To complete these minor subtractions and additions, record is here made of a specimen of *Empidonax virescens* (Royal Ontario Museum of Zoology collection, ex-Fleming collection) taken at Toronto on June 5, 1899, by J. Hughes Samuel. The late J. H. Fleming predicted that this species would ultimately occur at Toronto and kept a sharp watch for it in his garden, apparently not suspecting that a fine example was safely housed in his cabinets, the first and only Toronto record to date. — *L. L. SNYDER, Royal Ontario Museum of Zoology, Toronto.*

Short-tailed Weasel and Young in Manitoba.—On May 7, 1950, I encountered a Short-tailed Weasel (*Mustela enninea richardsonii*) at the entrance to my newly-filled woodshed. I remained about 10 feet away, while the weasel sniffed the air. It was bold, curious, but not defiant. It uttered no sound. After I retreated, it made its way into the adjacent bush. Sometime after, I again noticed it approaching the shed, carrying what appeared to be a young one in its mouth. I kept a close watch and was fortunate in observing it making four successive trips, each time carrying one of its young. The young appeared to be naked and were about three inches long. From the shed to the bush, it took approximately five minutes, and each time the parent seemed to remain in its new nest about ten minutes before making another trip. This transfer took place in broad daylight. The parent was beautifully furred, in summer pelage, with immaculate white underparts, and the black tail was exceptionally fluffed out. Now, when I enter the woodshed it makes its appearance, perhaps on the lookout for possible danger to its offspring.—*SAM WALLER, Indian School, The Pas, Manitoba.*

Bird lice (Mallophaga) from a Florida Gallinule and a Baird's Sandpiper.—On an undetermined date in the summer of 1948, Mr. W. Campbell found a dead Florida Gallinule (*Gallinula chloropus cachinnans* Bangs) on the highway at VanWagner's Beach near Hamilton, Ontario. Four lice were removed from the bird and proved to be *Laemobothrion emarginatum* Piaget (Laemobthriidae), identified by Professor A. W. Baker, Ontario Agricultural College, Guelph, Ontario. The specimens were mounted on slides and are deposited in a collection at McMaster University, Hamilton, Ontario.

On September 14, 1950, Mr. J. K. Reynolds removed seven bird lice from a Baird's Sandpiper, (*Erolia bairdii* (Coues)) at Port Stanley, Ontario. They were identified as *Actornithophilus albus* Emerson (Menoponidae) by Mr. C. F. W. Muesebeck of the U.S. National Museum, Washington, D.C. Four of the lice, mounted on microscope slides, have been retained by the U.S. National Museum and the three others are deposited in the collection of the University of Western Ontario. —*W. W. JUDD, Department of Zoology, University of Western Ontario, London, Ontario.*

BOOK REVIEWS

Mushrooms in their Natural Habitats. *By A. H. Smith. Two volumes. Vol. 1, Text, 626 pp:. 11 figures. Vol. 2, Illustrations, 231 stereo-kodachromes by Wm. B. Gruber. Sawyer's Inc., Portland, Oregon. 1949. $26.50 U.S. funds.*

Many attempts have been made in the past to illustrate the fleshy fungi by means of drawings, paintings, and photographs, but here for the first time, the combination of the stereoscopic camera and colour film has been used to produce a unique and highly successful contribution to the history of mycological illustration. The work comprises two volumes, of which the first contains introductory material and descriptions of the species illustrated, and the second consists of a case containing a Sawyer's Viewmaster and an album of thirty-three reels of stereo-kodachromes with seven species illustrated on each reel.

The author has taken a broad interpretation of the term mushroom, and representatives of most of the larger groups of fleshy fungi are included. A wide range of genera is illustrated but there is no attempt at completeness in any one group. Most of the species are reasonably common but some rare and unusual fungi are included together with some of the small and inconspicuous agarics usually omitted in popular mushroom books.

The specimens have been photographed in their natural habitats with only such rearrangement as was necessary to show essential features. The colours are, in general, very good and where they are not quite true, as in some instances, this is pointed out in the text. The photographs are not taken at a uniform magnification but the size of the fungus can usually be judged by comparison with the surrounding vegetation and the dimensions are given in the descriptions. The pictures not only illustrate the botanical characters but, to a remarkable degree, they bring out the beauty and fascination of these fungi. If one photograph could be singled out, that of *Aleuria aurantia* and its spore discharge is a special triumph.

The text volume is mostly devoted to descriptions of the fungi illustrated, but there are introductory chapters on mushrooms in relation to other organisms, fruiting habits of mushrooms, collection and preservation of specimens, macroscopic and microscopic characters and techniques of examination and study, nomenclature, and mycophagy. These chapters are written in an interesting and readable style.

The chapter on laboratory techniques and microscopic characters is especially noteworthy. The author has systematically discussed and figured the microscopic structures on which so much reliance is placed by modern students, and has described the methods for examination and study of these characters. Previously, much of this information has not been readily available.

The taxonomic treatment is also very interesting because it presents for the first time in a popular work, some of the viewpoints of modern students of the agarics. It has been evident for some time that the old Friesian classification was inadequate to express relationships in the light of modern studies, and also that the nomenclature of the agarics needed considerable revision in order to bring it into line with the International Rules of Botanical Nomenclature. The author has adopted a number of the newer genera but he has, on the whole, been quite conservative in his generic concepts. His discussion of the genera and of the revisions accepted by himself and proposed by other students are of great interest and will, no doubt, prove a stimulus to those who are interested in studying the relationships among the mushrooms. His adherence to the International Rules of Nomenclature results in some unwelcome but necessary name changes. The chapter in which the author discusses nomenclature and the International Rules is wholly admirable and is recommended reading for beginners and specialists alike. Some of the rules have been changed by the 1950 Botanical Congress, for example the starting point rule has been modified, and it is now recommended that all specific epithets be decapitalized.

In the section dealing with classification, keys are provided for all groups down to the species. The species are treated uniformly under the headings of general discussion; edibility; habit, habitat and distribution; and technical description. The inclusion of synonyms and literature citations is a most helpful feature.

The descriptions are very complete, including microscopic characters, and it is noteworthy that they are mostly based on the

actual specimens illustrated and that these specimens have been preserved, thus adding immensely to the scientific value of the work.

Two new species, *Armillaria zelleri, Cystoderma gruberianum,* and a new variety, *Lepiota molybdites* var. *marginata* have been described, and four new combinations proposed.

Although the book is intended primarily as a popular work and as such is outstandingly successful, it is also clearly of considerable scientific importance. We can only regret that it was not possible to include more species and hope that the work may be continued in future volumes. — J. W. GROVES.

Sea and Shore. *By Clarence J. Hylander. The MacMillan Co., New York, 1950, pp. I-VIII, 1-242. $3.50.*

"Sea and Shore" is a remarkable little book of introduction to the wealth of plant and animal life to be found along the ocean beaches. It tries to answer some of the very basic questions about which the student of marine life has wondered at some time or other, — why the oceans don't 'dry up', why the sea is salt, what happens to sunlight as it passes through seawater, and how it is utilized by the marine plants. The explanations are handled as simply and understandably as possible, and for such an elementary treatment of this broad and infinitely complex subject they avoid most of the pitfalls of inexactness. In the explanation of tides and tidal cycles, however, there seems to be no clear-cut distinction made between the solar day and the lunar day, leaving the reader wondering whether our day really is 24 hours long.

In describing the various groups of intertidal life, the author begins with the plants, differentiating the principal kinds of seaweeds and showing how their colour depends on the type of solar radiation present at their respective depths. He confines his treatment of animal life to the invertebrates, chiefly because they are dominant and ever-present. Beginning with the more primitive groups like the sponges and jellyfish, he goes on to describe the many kinds of bivalve shelled animals, the univalves, the starfish and its spiny skinned relatives. In keeping with his phylogenetic approach, he concludes with a discussion of the crustaceans, singling out the lobsters, crabs, shrimps, beach fleas, and barnacles as the most typical and most frequently encountered forms. The ecological aspect of beach life is stressed, a commendable improvement over the mere listing of animals likely to be found. Each species is shown to have a preferred habitat and geological range within which environmental conditions are most favourable to its existence and wherein it is thus most likely to be found. The limitation of distributional data almost entirely to the coastal areas of the United States probably reflects the great need for collecting and descriptive work of this kind on Canadian beaches. It is known, however, that numerous Atlantic species, which the author delimits from Cape Cod southward are found in the warm, southwest section of our Gulf of St. Lawrence.

The photographic illustrations of many of the animals and the various beach types are quite excellent. The animals have been filmed in their natural habitat with remarkable clarity and fineness of detail. Unfortunately, the line drawings accompanying many of the descriptions are not in keeping with the standards set by the photography, and could be much improved. Heavy outline drawings cannot hope to render correctly the fairy-like transparency of the big medusae, comb-jellies, and the like, as the inquisitive beachcomber would find them.

Although the elementary level of this book makes it a valuable asset to the beginner, many amateur naturalists might question some of the factual detail concerning the physiology and life histories of certain groups. For instance, recent findings have shown that the gills of marine bivalves are used chiefly as a filter-feeding mechanism, and that respiration is carried on for the most part in the mantle. Marine mussels do not have a glochidial larval stage parasitic on fish, but hatch directly from the egg into a planktonic veliger larva. The use of scientific names for the species in such large groups as the mussels would not be too high-level, and would lend clarity to the descriptions. The reader would like to know how to tell a *Mytilus* from a *Modiolus,* if he is to be given the more subtle distinctions between the various species of each genus.

To the interested reader, "Sea and Shore" affords a pleasant and very educational visit to the sea beach, without the expense involved. The book is to be commended for its inspirational approach to a better understanding of the life of the seashore. — E. L. BOUSFIELD.

A Field Guide to the Butterflies. *By Alexander B. Klots. The Riverside Press, Cambridge, Massachusetts, $3.75.*

The Peterson Field Guide Series has added another outstanding volume to its well-known books. The present volume is an accurate reference for the Butterflies and Skippers of North America east of the Great Plains. The author, Dr. Alexander B. Klots, is a well-known specialist of butterfly taxonomy and biology. This knowledge, combined with considerable field experience, has enabled him to prepare this book, which adequately fills a gap in the literature and enables the beginner or the advanced student to recognize the butterflies and prepare a collection of them. The scientific names are in accordance with current nomenclatorial usage, and the systematics is based on a sound philosophical foundation. The book is remarkably complete and accurate. It contains about 350 pages and includes colour reproductions of 247 species as well as 232 photographs. There is a considerable amount of information dealing with the environment, behaviour, coloration, distribution, geographical variations, morphology, and life-histories of butterflies. The subspecies are considered and their significant characters are mentioned. The final part deals with butterfly classification, literature, and a complete check-list. The book will be extremely useful to specialists, amateurs, teachers, natural history organizations, or anyone interested in butterflies. — T. N. FREEMAN.

A Laboratory Guide to the Anatomy of the Rabbit. *By E. Horne Craigie. University of Toronto Press, 1951; pp. I-VIII, 1-113, 28 figs.*

The teaching of vertebrate zoology at the University of Toronto has long favoured the concentration on selected types rather than the general survey of a multitude of forms. With pre-medical instruction as a very important part of the zoology programme, the rabbit has been emphasized as a typical and readily obtainable mammal for detailed dissection. Forty years ago the late Professor B. A. Bensley provided as a guide to such studies his "Practical Anatomy of the Rabbit", which has served its purpose admirably. Apparently, however, a need has been felt for a less detailed treatment of the subject for students other than those preparing for advanced work in zoology or anatomy. The present work, by one of Canada's leading comparative anatomists, is therefore intended, not as a replacement for Bensley's manual, but as a guide to a parallel but more general treatment. The arrangement of the material is much like that of the older work, but the grouping is more by systems than by regions. There is a preliminary survey of the various kinds of tissues, a discussion of terminology, and then the major portion of the manual, a description of the gross anatomy. Anatomical names, as in Bensley, are mainly taken from human anatomy, no doubt the only procedure where pre-medical instruction is involved, but hard on the comparative anatomist, who must learn two or sometimes three nomenclatures for the one set of structures. Professor Craigie has contrived to produce a manual that is more readable than Bensley's and that omits no important aspect of mammalian anatomy. It can be recommended both for the college laboratory and for the student working on his own. The latter, however, will have to go elsewhere for instruction on the preparation of his dissection material.—LORIS S. RUSSELL.

Lichens of the State of Washington. *By Grace E. Howard. University of Washington Press, Seattle. 1950. Pp. i-ix, 1-191, 11 plates.*

The author, who published a preliminary report on the lichens of Washington State in 1937 (Bryologist, XL, p. 91), has now collated the existing records to date in the form of a students' handbook with keys and descriptions. Many of the records are based on her own collections in various parts of the State between 1928 and 1942.

A total of 335 species, in 69 genera belonging to 28 families, is recorded, and the author points out that this number will doubtless be augmented by further collections within the State. No new entities are described, but one new combination is made (*Cetraria arborialis* (Merr.) Howard, which is synonymous with *C. subalpina* Imshaug in Mycologia, XLII, p. 746; 1950). Some 44 of the species and varieties are depicted in good photographic illustrations.

The artificial keys to the genera on pp. 4-10, with the main divisions "crustose lichens", "squamulose or foliose", and "fruticose", are serviceable and likely to prove useful to beginners. Those to the species are sufficient to enable the student to place material in or near the appropriate species, in many cases in a somewhat collective delimitation; the description of *Letharia vulpina,* for instance

(p. 149), obviously includes also the related *L. californica* (Lév.) Hue. Similarly the description of *Alectoria sarmentosa* given on p. 152 is certainly based on heterogeneous material. A few contributions in previous literature have been neglected, as for example Müller Argau's paper in Flora, LXXII, p. 362 (1889), and in one instance this has led to the inclusion of a species in the wrong genus (*Lecidea Pringlei* Tuck. on p. 58 has been shown to belong to *Lecanora* sect. *Cladodium* in Bryologist, XLII, p. 32; 1939).

This carefully prepared study satisfies an undoubted need for a students' working flora for the lichens of Washington State and adjacent regions, and is considerably superior in its treatment to previously available floristic publications, such as Fink's "Lichen Flora of the United States".—I. M. LAMB.

The Birds of Greenland. *Text by Finn Salomonsen; illustrations by Gitz-Johansen. Part 1, 158 pp., 17 pls. Ejnar Munksgaard, Copenhagen, Denmark. 1950. ($9.00)*

This sumptuous volume deals with the loons, petrels and their allies, swans, geese, ducks, and cormorants of Greenland, the world's largest island. Its publication is supported by the Danish Government. The text, by the well-known Danish ornithologist Finn Salomonsen, is a product of his broad experience with the Greenland avifauna. It is written in both Danish and English arranged, respectively, in parallel columns. Each species account, headed by the Danish, English, Eskimo, and scientific name, includes a brief but adequate description of the subject; a detailed and documented account of its Greenland distribution and seasonal status; its general behavior; breeding and feeding habits; relationships with the Greenland human population; and there are taxonomic comments in cases where the author feels that these are needed. These and other aspects of knowledge concerning Greenland birds are interestingly and authoritatively presented. The fullness of the species accounts is illustrated by the fact that they occupy (bilingually) from two to nine large pages.

Seventeen water colors by the Danish artist Gitz-Johansen handsomely illustrate this, the first volume. Mr. Gitz-Johansen, in the course of 17 years, has travelled over the whole of Greenland sketching, in addition to other subjects, the birds he encountered there. Perhaps ornithologists may disagree in appraising small details concerning some of these bird portaits (this reviewer does not consider them all equally effective) but few will fail to recognize their beauty, life, and unusual originality.

This splendid volume is a most welcome addition to ornithological literature. Two additional volumes will, it is understood, complete the work. Their appearance will be awaited with much interest. — W EARL GODFREY.

Fluctuations in abundance of the Lake Erie Cisco *(Leucichthys artedi)* population. *By W. B. Scott. Contributions of the Royal Ontario Museum of Zoology No. 32, 1951.*

This paper presents information on the physiography of Lake Erie and the history of its commercial fisheries from 1867 to 1946. The relative production of ciscoes in the different areas of Lake Erie has been studied, together with information on both the United States and Canadian commercial catches.

From a study of the age composition of samples of the population taken during the years 1946-1948, it was found that in certain years more than 95 percent of the commercial catch consisted of fish of a single year class. It was concluded that a large spawning stock is not essential for the successful maintenance of the Lake Erie cisco fishery. The commercial catch, which presumably is related to the total cisco population, was, in 1943, the lowest in over 60 years and the fish produced from the spawning in that year provided more than 95 percent of the commercial catch in 1946 the year of greatest recent abundance, and more than 84 percent of the 1947 commercial catch. An inverse relation was found to exist between the catch of cisco from Lake Erie and that from the other Great Lakes. When fish were taken in quantity in Lake Erie the demand for ciscoes from other areas was decreased, which resulted in a decreasing intensity of fishing in the other Great Lakes. When the catch of Lake Erie ciscoes, which are preferred fish on the market, was low the catch in the other Great Lakes was increased through increased effort stimulated by higher prices.

The fluctuations in the commercial catch over the period of years for which statistical information is available cover a wide range. It is pointed out that some of the fluctuations in commercial catch may be produced by weather and by marketing conditions, but in

view of the volume of fish handled it is considered that the fluctuations in annual catch bear a relation to the actual populations available in the years concerned. Overfishing alone does not appear to be the complete answer to the problem.

Factors influencing hatching and survival of ciscoes, including meteorological conditions, silting, mechanical injury, abundance of food, predation and disease are discussed as well as the relation between successful early development of the cisco in relation to that of other species of fish present in the lake. A study of the fecundity of the cisco revealed that the higher egg production of Lake Erie fish is related to their larger size as compared with those of Lake Ontario.

In his introduction the author has pointed out the great value which sound predictions of the approximate size of fish populations would have in planning for the handling of the expected crop. Although much information is presented regarding the past fluctuations in the cisco population and of the factors which may influence such fluctuations, no method has been suggested by which such sound predictions can be made.—V. E. F. SOLMAN.

The Bighorn Sheep of Banff National Park. *By Hubert U. Green, National Parks and Historic Sites Service, Development Services Branch, Department of Resources and Development. 53 pp., 15 pl., 1 map, 1950.*

Although this report on the bighorn sheep is confined to Banff National Park, it is so thorough and complete a study that it might well serve as a monograph of the species as a whole. The author, who devoted eleven years to his investigation, treats almost every aspect of the animal's habits and life history, including species competition, faunal and floral associates, behaviour, parasites and disease. Under the heading physical characteristics, he gives a general description of the adult, male and female, weights, measurements, seasonal molts, horn growth, voice, hearing and vision. The section on behaviour is rather brief, although more detailed than anything published to date. The ranges occupied by the Banff herds are discussed in considerable detail with a map showing their relative size and location. Twenty-six excellent photographs show the sheep in natural habitat, salt licks, sheep and deer tracks for comparison and diseased animals.

In the section on age composition the author points out that ewes and half-grown rams are difficult to distinguish in the field, and in his breakdown of age classes he allows for a margin of error where the two might have been confused. In view of this, one wonders at the validity of figures compiled by less competent observers based on briefer studies.

It is also interesting to note that Mr. Green observed no well defined seasonal movements in the park. Reports of seasonal migrations in other localities might bear further investigation.

Mr. Green's report will be favourably received both as a fund of information on this interesting mammal and as a fine example of a thorough study of a single species. It is to be hoped that other biologists will follow Mr. Green's example and concentrate on intensive studies of mammals on the species level. Such studies are definitely to be preferred to a number of superficial investigations of several species, or of research on selected aspects of a mammal's habits or life history.—AUSTIN W. CAMERON.

Determination of Hairs by Impressions. *By V. H. H. Williamson, Journal of Mammalogy, Vol. 32, No. 1, pp. 80-84.*

The key character upon which hair identification is based is the cuticle with its scale-like configurations. These structures, however, are difficult to observe because the cuticle is transparent and the pigments of the underlying cortex and medulla create a disruptive background for microscopic examination. To overcome this difficulty a technique has been devised whereby impressions of these structures are made on a plastic film mounted on a microscope slide. This method has the disadvantage that the plastic media in current use necessitate considerable preparatory treatment and the results are often unsatisfactory.

In the present paper the author discusses a technique using a vinyl acetate resin known commercially as "Gelva". Its outstanding features are: its slow rate of drying, clearness of impressions, ease and speed of handling, and the ability to store a quantity of prepared solution for an indefinite period of time. Briefly the procedure is as follows: a layer of Gelva is spread on a microscope slide and allowed to dry for 30 minutes. Hairs from which impressions are desired are then placed on the medium and covered with a cover glass. Then the slide is placed in a press and sub-

jected to light pressure for a few seconds. The hair is removed with a camel hair brush and the mount is ready for examination.

Illustrations of scale impressions from moose, deer, elk and caribou are shown and an identification key for these species based on cuticular configurations is given.—AUSTIN W. CAMERON.

Tidewater to Timberline. *By Dan McCowan. Macmillan Company of Canada Ltd. Toronto. 1951. $3.00.*

Readers should not be mislead by the title of this book into supposing it to treat the various life zones from ocean to mountain peak. In fact the author denies the desirability of such a procedure in his foreword. This is the latest of Dan McCowan's random collections of anecdotes, reminiscences and odd bits of information. The style is light and conversational and there is plenty of entertainment in it. Each chapter is devoted to a topic; for example, there is one on the dance of the prairie chicken, one on animal speeds, one on night animals, and, appropriately at the end, one on tails.

I have no quarrel with the arrangement. Although there is a great need for good books that tell of plants and animals in their life zones, in simple terms, there is also a place for books of the style of McCowan's volume. It is only fair to warn the reader, however, that much of the information stated as fact in the book has not been checked. Without having taken time to do any checking in the literature personally I can say that a number of the statements are definitely erroneous and many others are unproved. A few examples will suffice.

The "teal" is said to be second to none in aerial speed; this alibi for unsuccessful hunters has been repeatedly exploded. It is definitely known that the Green-winged and Blue-winged Teal are among the slowest of ducks. Their small size leads the unpractised observer to overestimate their distance and, consequently, speed.

Swifts do not, as stated, belong to the swallow tribe, but are related to the hummingbirds. There are many minor inaccuracies in the chapter on speed, most of which could easily have been avoided by spending a day or two in any adequate biological library.

In the chapter on night animals the author is plainly confused about the mechanism of the bat's so-called radar system. It is surprising, also, to find no mention of flying squirrels in this chapter, although they are discussed elsewhere in the book.

"Gryllus the Grasshopper" makes a nice alliterative chapter heading, but *Gryllus* is, of course, the field cricket. The musk-ox does not have wool, suitable for weaving, but smooth hair. *Equisetum* is far from being "the most primitive form of plant life now present on this earth". The snow goose is said to pass mainly west of the Great Lakes, except for an occasional flock near Quebec, which hardly does justice to the fact that the entire population of the Greater Snow Goose passes below Quebec where its autumn concentration is one of the greatest of all wildlife spectacles.

An unnecessary mystery is made of the echelon flight of geese, since the explanation is obvious to anyone with the slightest knowledge of aerodynamics and has recently been given in a popular book on bird flight. Every wing in forward motion forms a vortex at the tip; the geese ride in the updraft of the outer half of the vortex formed by the bird ahead.

The horizontally flattened tail of the whale is, contrary to the author's inference, an efficient swimming organ, whose action has recently been discussed in print. When we remember that the power required to drive an object through a fluid medium increases roughly as the square of the linear dimension the whale's moderate speed appears quite creditable.

The illustrations, stated to be from photographs by the author, are generally disappointing. Few appear to have been taken in the wild. One, at least, is taken in a zoo; some seem to be of mounted specimens, retouched or with a background faked in. The improbable stance of the northern phalarope may puzzle the reader until he compares it with Brasher's drawing in *Birds of America*. —D. B. O. SAVILE.

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NOTES ON THE BIRDS OF THE FORT CHIMO, UNGAVA DISTRICT [1]

IRA N. GABRIELSON and BRUCE S. WRIGHT

ON August 18, 1948, the writers arrived at the Hudson's Bay Post at Fort Chimo. The 19th and 20th were spent at that point getting gear together and observing the birds in the immediate vicinity. On August 21 we left on the Eskimo "Peterhead" boat that had been previously engaged for us by Mr. P. M. Wright, the Hudson's Bay Company manager. Leaving Fort Chimo about noon, we traveled down the Koksoak River, arriving at an anchorage among the small islands at the river mouth early enough in the evening to permit several hours of exploration.

On the 22nd we traveled to False River and remained along that stream until the 26th and returned to Chimo on the 27th. Each day we were able to make one or more trips ashore to visit either the rocky islands along the coast, the tundras, or the rocky beach pools exposed by low tide.

At the head of False River and at Fort Chimo on the Koksoak, patches of small spruce, tamarack, willow, alder, or birch were well scattered in the more sheltered spots. True tundra lands lie at the mouth of both streams.

While our interest was primarily in waterfowl and the area was selected for such work, we found little real marsh, the nearest approach to it being a meadow cut by an intricate series of tide channels at the up-river end of the tide effect on False River. This river is in reality a great shallow bay at high tide with several small streams flowing into it, while at low tide it is a great mud flat sprinkled with tide pools (some of which are rather large), and cut by tiny trickles of water from these streams.

The tundra along False River and that from Fort Chimo to Ungava Bay was dotted with innumerable ponds and lakes of varying size, but the only water birds noted using them were broods of Old-squaw, Red-throated Loon, Red-breasted Mergansers, Green-winged Teal, and Pintails. All other waterfowl and the shore birds were concentrated in the salt water bays and tidal areas.

We worked long hours ashore and on the boat doing the necessary preparation of specimens, largely while the boat was moving from one anchorage to another. This had to be done at suitable tide stages and afforded irregular but sufficient time to care for specimens.

Johnny Angnetuk, the Eskimo owner and skipper of the boat, was a skillful navigator and also had a good knowledge of the birds. He carried a long, old-fashioned telescope and after making the boat safe, usually climbed to a high point and surveyed the country and the bird life.

He spoke little English but could read a map and recognize pictures of the various birds. Since neither of us spoke Eskimo, our efforts to convey our wishes to him must have been ludicrous. After shouting and sign language had been exhausted, we were always in doubt as to the effectiveness of our explanation. That he understood as frequently as he did is more of a tribute to his intelligence than to our linguistic ability.

It was relatively easy to get information from him regarding the whereabouts of the birds. It became a regular performance. We produced either a picture or a specimen, if we had one, and pronounced the English name. He would respond, giving an Eskimo name. The next step was to produce our watch and point to some figure and pronounce his Eskimo word as a question. He would point to some other figure or say "one sleep" or "two sleeps" and was invariably right. Some time during the interval indicated, he would find the birds.

We eventually became accustomed to his rather startling methods of navigation, particularly his system of anchoring the boat. Only twice during the trip did we ride at anchor in a normal way. On all other occa-

[1] Received for publication December 1, 1950.

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sions he beached the boat on a falling tide, and as the water receded, put timbers cut to the proper length under the guard rails. There we sat on an even keel, high and dry, until the next tide. Once we estimated we were five miles from the nearest water.

We soon learned not to plan definite schedules of arrival at any point even though everything looked propitious. The boat could not buck either the tide or a heavy wind. Consequently, we came to expect that almost any time Johnny would spring one of his few English phrases, "Watta no good"—head for the bank, and beach the boat until the next tide. Once when there seemed to be no apparent reason for stopping, thirty minutes of falling tide revealed a boulder-strewn bar that completely blocked the stream.

While Johnny's methods were somewhat unorthodox according to our standards, they worked. His knowledge of the country and the birds enabled us to get in seven days the information which we had anticipated would require a minimum of ten days or two weeks.

Mammals were exceedingly scarce with the exception of a lemming and a mouse (*Microtus pennsylvanicus labradoricus*) which was more abundant. Specimens of the mouse were collected. Otherwise one shrew (*Sorex cinereus cinereus*) caught at Fort Chimo, a single pine squirrel seen on False River, two adult white whales, one of which was followed by a half grown calf, a few harp seals, and a single caribou track near Fort Chimo comprised the record. A single small wood frog (*Rana sylvatica cantabrigensis*) was captured in the tundra near the airfield on August 30. This specimen represents the farthest north record for the species east of Hudson Bay.

While we were working up our material, John Aldrich called attention to a large number of bird skins in the U.S. National Museum collected at Fort Chimo and along the Koksoak by Lucien M. Turner between June 18, 1882, and October 3, 1884. This collection had been reported on briefly by Turner (Pro. Nat. Mus. Vol. 8, 1885, pp. 233-254), but no careful study of it had been made. He and Herbert Friedmann suggested that this material be included in our report, and Dr. A. Wetmore, secretary of the Smithsonian Institution, gave his approval.

Many of the skins are no longer in the Museum, having been traded or donated to various collections, but those still available have been examined. There are a number of catalogue entries of unnamed birds which a rather careful search through probable species has failed to reveal. The catalogue credits some 1623 birds to Turner, the majority listed as from Fort Chimo which was his headquarters during his work for the Signal Corps. The industry of the man was amazing, and one can only wonder how he managed to find time to maintain any weather records. Some skins credited to Chimo in the catalogue were taken at points remote from that area. A careful check has been made of all species mentioned in his brief report, and data from the skins rather than catalogue entries have been used for collecting localities.

A few of the unidentified skins have been found in looking for Alaskan material in the collection, but there are a number of entries which cannot be identified.

Turner listed 84 species from the Fort Chimo area, including the Koksoak River, False River, and the bayshore and the bay between the two. Of these he considered 51 to be breeding or summer residents.

As we were working on this report, another paper on the birds of Ungava which included many references to the birds of the Chimo area appeared (Hildebrand, Henry, "Notes on the Birds of the Ungava Bay District," *Canadian Field Naturalist*, Vol. 64, March-April 1950). The author made three trips into Ungava, using Fort Chimo as headquarters and working much beyond the bounds covered by Turner or ourselves. By checking the days on which he was in our area in 1947 and 1948, we have been able to secure a list of birds comparable to ours and Turner's. Hildebrand was in the approximate area covered by this paper on June 14 to 28, July 21 to August 4, and September 1 to 8, 1947, and March 21 to April 17, June 17 to July 14, July 18 to 24, and September 2 to October 5, 1948. While he was engaged primarily on fisheries work, he made notes on 41 species, of which 35 were among those listed by Turner as breeding. He also listed a number of other species in areas outside the scope of this paper. We saw 49 species, of which 34 were breeding or residents.

Hildebrand collected the King Eider and Fox Sparrow in this district which neither we nor Turner saw; he also reported Myrtle Warblers and Ruby-crowned Kinglets from outside the area which Turner did not record. Hildebrand saw Northern Eiders, Spruce Grouse, Semipalmated Plover, Short-eared

Fig. 1. Characteristic little spruce patch in the muskeg. One side cut away by caterpillar tractors from a nearby airfield which gives a better picture of the size of the trees.

Owl, and Gray-cheeked Thrush which we missed among the breeding birds. We saw the Green-winged Teal, Harlequin Duck, Red-breasted Merganser, and Least Sandpiper, which Turner recorded as breeders or residents which Hildebrand did not list for the area, and added the Black-backed Gull and Ruby-crowned Kinglet to the Chimo list.

Turner collected 11 species of breeding birds which the later observers missed. They were Goshawk, Black Gyrfalcon, Golden Eagle, Horned Owl, Snowy Owl, Hawk Owl, Arctic 3-toed Woodpecker, American 3-toed Woodpecker, Tree Swallow, Rusty Blackbird, and Pine Grosbeak.

Hildebrand believed the cutting of spruce near the Hudson's Bay Post was a considerable factor in eliminating some of these species, but the cutting affects such a very limited area that this could not have been an important factor except in the immediate vicinity. The scarcity of raptors may and probably does have some relation to the scarcity of rodents which were with the exception of *Microtus* rather scarce; *Microtus* was abundant only in small widely scattered areas.

Neither Hildebrand's nor our own work produced any woodpecker records, a not uncommon experience in this type of country where such birds are seldom abundant. The absence of Pine Grosbeaks is not surprising, but the failure to find the Rusty Blackbird is surprising in view of its rather wide distribution in this type of terrain.

The uncertainties of short field trips are well illustrated by a comparison of our records which were made in the Fort Chimo area between two of Hildebrand's visits. He stated that he took three specimens of the White-rumped Sandpiper at the mouth of the Koksoak on August 31, 1947, but had no other records. Yet, during our stay on the coast, False River, and the lower Koksoak, this species was incredibly numerous, far outnumbering any other bird. Hildebrand was east of this area on George River at this time, and the birds evidently moved south and west in the interval between our departure from the coast on August 26 and his arrival on September 2.

He saw and collected downy young and adult Northern Eiders at the mouth of False River on July 3, and we saw none at any time during the trip. The Eskimos indicated that these birds were to the north and west at that time. He found the Semipalmated Plover common on False River, and we failed to find it at all. On the other hand, we found American Golden-eyes common and Green-winged Teals, White-winged and American Scoters, and Red-breasted Mergansers in False River which Hildebrand did not note during his stay. Both

Hildebrand's records and ours indicate that Black Ducks are more numerous than in Turner's time, and that Old-squaws were somewhat less abundant.

We had formed an opinion that both Pintails and Green-winged Teals were more numerous than Turner's notes indicated. Hildebrand's report strengthens that opinion for Pintail numbers, but as he failed to find the teal during a much longer stay than ours; perhaps we simply had good luck.

The habit of concentrating in the lower rivers and salt water bays, even before the young were able to fly, a movement indulged in by many of the waterfowl, can change the relative abundance or scarcity of birds in any given area almost overnight. Undoubtedly this factor accounts for some of the variations in the field notes made in the same areas at different times in the same summer.

Gavia stellata (Pontoppidan). Red-throated Loon

This bird was first seen on the lower Koksoak on August 21. A pair, with one youngster just learning to fly, was watched for some time at the mouth of False River the next day. The beginner could not get far off the water despite strenuous efforts, and the parents circled our boat with the usual raucous cries as long as we were close. Two or more of these loons were seen each day, and a pair with two fully feathered young still unable to fly were found on a little tundra pond about a mile from False River on August 25.

Downy young from at least two broods were collected by Turner on July 13 and July 30, 1884, at Fort Chimo. There are adults collected as early as June 20, 1884, at Chimo, and one taken near the mouth of the Koksoak on September 9, 1882. He considered it plentiful, and it is still rather common as a regular breeder.

Colymbus auritus Linnaeus. Horned Grebe.

Turner reported seeing a single grebe, presumably this species, in a pool near the mouth of the Koksoak on September 15, 1882. We did not encounter it.

Oceanodroma leucorhoa leucorhoa (Vieillot). Leach's Petrel.

Turner secured a petrel on July 12, 1882, some twenty miles above the Koksoak River mouth. He states that he saw another seventy miles up the river on October 9, 1882. He published the record as *Procellaria pelagica*. The specimen is still in the U.S. National Museum (No. 94554) and is *leucorhoa*.

Ardea herodias subsp? Great Blue Heron.

One seen to fly from the creek which is the outlet to Whitefish Lake near Fort Chimo in the summer of 1880 by Mr. John Saunders as reported to Turner.

Branta canadensis canadensis (Linnaeus). Eastern Canada Goose

At the time of our visit the geese were concentrated in the lower rivers and in tide pools and tundra lakes close to salt water. Seven were noted on the lower Koksoak on the 21st, more than 100 including two broods still flightless near the mouth of False River on August 22, and over 500 on the 26th on Congnarauya Point, the majority of them being on the Koksoak River side. Our two juvenals fully feathered except for wing quills are referable to this form.

Turner recorded this goose as a common breeder near the mouth of the George River where eggs, young, and adults were secured, but collected no specimens either at Chimo or on the immediate coast.

Branta bernicla hrota (Müller). American Brant

Turner stated that it was seen in the spring at Chimo only. He apparently did not collect any birds since there are no specimens in his collection. We did not encounter the species.

Anas platyrhynchos platyrhynchos Linnaeus. Common Mallard

Turner, considering it rare at Chimo, stated that specimens were taken at the mouth of the Koksoak, but no specimens could be found. We did not encounter the species during our brief trip.

Anas rubripes Brewster. Black Duck

Black Ducks outnumbered all other waterfowl during our visit. Careful checks were made on their numbers, distribution, and food to secure data for use in the over-all study of the Black Duck being conducted by Wright. A number of specimens were collected.

Turner stated that it was not common in Hudson Straits, and doubtless breeds there, as a female obtained in July had the abdomen bare and no quills on the wings. There is an adult female taken at Fort Chimo on July 1, 1884, by Turner (No. 101188) in the Museum. It is catalogued as an eider. We collected two

adult moulting females on August 25, and a third adult with new primaries the same day.

Anas acuta tzitzihoa Vieillot. American Pintail

Twenty-one Pintails were counted on the 21st on the lower Koksoak. They were also noted on August 22 and 23 on False River, a two-thirds grown brood of four being included in the 29 seen on the latter date. Twenty-seven birds were counted on the 26th along the shore of Ungava Bay between the two rivers.

Turner considered it uncommon, but reported young of the year as taken at the mouth of the Koksoak. A Pintail is catalogued in the U.S. National Museum (No. 94490) as taken by Turner, but the skin could not be found.

Anas carolinensis Gmelin. Green-winged Teal

Five Green-wings were found in a little tundra pool about three miles east of Fort Chimo on August 19. Nine were noted on False River on the 22nd, and the same number along the shore of Ungava Bay on the 26th.

Turner obtained fully fledged young in Chimo in July, but no skins of this bird collected by him could be found. Two adult females listed in the catalogue as taken at Chimo on August 25, 1884, had been donated to other museums.

Bucephala clangula americana (Bonaparte). American Golden-eye

A single bird was noted on the 22nd on False River and on the same date a considerable raft of salt water ducks were noted across the bay too far for identification. On the down river trip on the 24th, we traversed that part of the bay and counted 116 Golden-eyes. This is a minimum number as only those on the surface at a given time in each small block of water being counted were considered. The birds were actively feeding and diving, and the number present exceeds this count. Six were seen on False River on the 23rd, and twelve on Ungava Bay on the 26th. One bird was collected on the 24th.

Turner stated that he took specimens on Ungava Bay, and one is catalogued in the U.S. National Museum (No. 94491) but no skin was found. He considered it abundant in the fall.

There is a male Barrow's Golden-eye taken at Nakiak, Labrador, by Turner in the spring of 1883 still in the collection (No. 100917) which is outside the territory of this paper.

Histrionicus histrionicus histrionicus (Linnaeus). Eastern Harlequin Duck

Turner stated that this duck was abundant in Hudson Straits and that specimens were taken in Ungava "where it certainly breeds". U.S. National Museum catalogue Nos. 94492-8 inclusive are assigned to this species as collected by Turner. But the catalogue does not contain dates, sex, or locality of the specimens of which only one could be found. It (No. 94498) is an adult female collected July 10, 1883, at Davis Inlet on the Labrador Coast.

We saw five Harlequins at the mouth of the Koksoak on August 22, the only time we observed the species.

Clangula hyemalis (Linnaeus). Old-squaw

Seven Old-squaws were present on False River on August 22, a brood of nine still unable to fly were found on a small island in the river on August 24th, a single adult later on the same date, and fourteen were noted on Ungava Bay on the 26th.

Turner considered it an abundant breeder, and collected eggs, downy young, and adults around Fort Chimo. There are six downy young and an adult female all taken in August of 1882 and 1883 at Fort Chimo still in the U.S. National Museum collection, and five others catalogued which could not be found. Apparently this bird has decreased in numbers since Turner worked this territory.

Somateria mollissima borealis (Brehm). Northern Eider

Turner stated that it was an abundant breeder, a remarkably different condition from that which we found. In our ten days we did not see a single eider, and if we correctly understood the Eskimos, we would have been required to go some distance north along the western side of Ungava Bay to do so at that season.

Turner took eggs, young of the year, and adults in Ungava Bay. There are eighteen skins (in 6 cases heads only) in the U.S. National Museum. There is a single adult male (No. 101175) taken at Fort Chimo on June 20, 1884, and seven skins and three heads labeled adult females taken in June and July, 1884; one female taken at the mouth of the Koksoak on September 20, 1882, and three heads and two skins and another skin lacking the original label but taken on the same date and, therefore, probably from the same locality, all collected on June 28, 1883, at the mouth of Whale River, the next large stream to the east of False River.

Melanitta deglandi deglandi (Bonaparte). Eastern White-winged Scoter

Twenty-five of these birds were found in the mouth of False River on the 22nd, and a single bird seen near the head of tidewater on the 24th. Nineteen were counted along the shore of the Bay on August 26. Turner stated it was common along the east coast, but did not mention it or collect specimens in the Ungava district.

Melanitta perspicillata (Linnaeus). Surf Scoter

Turner stated this species was rare in Hudson's Straits, but did not mention taking specimens. There are two females in the U.S. National Museum (No. 94526-7) taken by Turner near the mouth of the Koksoak River on September 20, 1882. We did not see it.

Oidemia nigra americana Swainson. American Scoter

Fifty or more American Scoters were found near the mouth of False River on the 22nd, and four farther upstream on the 24th. Turner stated that he obtained specimens at the mouth of the Koksoak. There is one female still in the Museum (No. 100923) taken July 14, 1884, labeled Fort Chimo but possibly taken farther down the river.

Mergus serrator serrator Linnaeus. Red-breasted Merganser

We saw a single bird at the mouth of the False River on August 22 and found two females with broods of seven and nine respectively on the same stream on the 23rd. Another female and a brood of eight about half grown was seen on the 25th, and a female with six young on the shore of Ungava Bay on the 26th.

Turner considered it to be common, but only a single female taken at Chimo on June 3, 1883, could be found. Seven skins are listed in the catalogue.

Accipiter gentilis atricapillus (Wilson). Eastern Goshawk

Turner considered it a winter resident but reported only one specimen, one juvenal male taken at Forks some distance up the river from Chimo on December 1, 1884. We did not see it on our trip.

Buteo lagopus s.-johannis (Gmelin). American Rough-legged Hawk

This was the only common hawk. One or more were seen each day except on the 23rd from the 21st to the 26th. A pair with two young just out of the nest were found on the 24th on a cliff near False River. Twenty-nine pellets picked up under this nest all contained lemming and meadow mouse hair and bones. Seven birds were the greatest number noted in one day.

Turner collected a number at Fort Chimo. There are two downies, 2-days old from Chimo, taken July 1, 1884, adult male and female June 17, 1883, at the same place, and two young females September 9, 1883. One of these is a very dark specimen.

Aquila chrysaetos canadensis (Linnaeus). Golden Eagle

Turner stated he had secured specimens from the Ungava district and also that a pair bred at the Forks. There is one adult male taken at Fort Chimo, June 23, 1884, still in the collection (No. 101130), and several others catalogued which could not be found.

Falco rusticolis obsoletus Gmelin. American Gyrfalcon

Turner listed three races of gyrfalcons from Fort Chimo, *F. r. candicans* and *F. r. obsoletus* as common and breeding, and *F. r. rusticolus,* the Iceland form as being present in winter. There are five gyrfalcon skins taken by Turner from this area still in the U.S. National Museum taken in the fall between August 11 and September 19. Under the present concept of the species, all must be classed as *obsoletus.* We did not see any gyrfalcons, although it was one bird for which a vigilant watch was maintained.

Falco peregrinus anatum (Bonaparte). Duck Hawk

A single Duck Hawk passed our window at Fort Chimo on the 21st, and a nest with five birds still in the vicinity was found near the mouth of False River on the 25th. The Eskimos evidently found another nest in the opposite direction from our anchorage as they returned with an adult and young in their game bag.

Turner called it abundant at Chimo, and eight of his skins are still in the U.S. National Museum. They consist of three juvenals taken there August 17, 1883, and five adults, four from Fort Chimo, taken between June 18 and September 28, and a female from the mouth of Whale River on June 27.

Falco columbarius columbarius Linnaeus. Eastern Pigeon Hawk

A Pigeon Hawk was noted at Whitefish Lake, east of Fort Chimo on the 19th. A

Fig. 2. Glacial scratches on bed rock near Fort Chimo.

single bird flew around our anchored boat on False River on the 23rd, and one was collected on the 24th on the downstream trip.

There are three Pigeon Hawks taken at Fort Chimo by Turner, two adult females taken June 24 and August 27, 1884, and an adult male secured on June 27, 1884. Turner did not comment on these in his report which may have been written before this 1884 field work, but did mention Audubon's and Coues' records for other parts of Labrador.

Canachites canadensis canadensis (Linnaeus). Hudsonian Spruce Grouse

Turner records this as an abundant resident, and there are 32 or more skins in the U.S. National Museum collected by him at Forks and Fort Chimo. This includes four downies taken in June and July, and both adults and juvenals collected at all seasons from June 20 to January 20.

We did not see the species at all in our work in the timbered sections around Fort Chimo and from such information as we could get from the Hudson's Bay manager, the bird is decidedly less abundant than formerly even in years of grouse abundance.

Lagopus lagopus ungavus Riley. Ungava Willow Ptarmigan

Local residents informed us that ptarmigan were increasing following a low cycle. We encountered two covies, the first containing five birds at Whitefish Lake on the 19th, and a second one of nine birds near the head of False River on the 23rd. Specimens were taken from each.

There is in the Museum a large series of 90 or more of this species taken by Turner at all seasons and ranging from newly hatched chicks to adults. He stated it was abundant and breeding by the thousands at Fort Chimo, a statement well authenticated by the series of skins still available. Among them an adult male (No. 101068) taken on July 22, 1884, at Fort Chimo was selected by Riley as the type of this race.

Lagopus mutus rupestris (Gmelin). Common Rock Ptarmigan

We covered a large area of barrens suitable for this species but found only a single covey of five birds on the shore of Ungava Bay on the 26th.

Again our experience was contrary to Turner who called them plentiful on treeless areas. He took a large series of both young and adults, many of which are still in the Museum collection.

Charadrius hiaticula semipalmatus Bonaparte. Semipalmated Plover

Turner found it abundant on the coast and collected downy young and adults. There are

still six of his specimens from Fort Chimo in the Museum, including downies taken on July 5 and July 15, 1884. We did not encounter it on our trip.

Pluvialis dominica dominica (Müller). American Golden Plover

Turner took a female at the mouth of the Koksoak on September 19, 1882, which is still in the collection, and two others are catalogued which could not be located. He commented that it was found at the mouth of the river in the fall only.

Arenaria interpres morinella (Linnaeus). American Ruddy Turnstone

Ten turnstones were seen on the islands at the mouth of the Koksoak on the 21st, five on lower False River on the 22nd, and two birds which were collected on the shore of Ungava Bay on the 26th.

Turner called them occasional and stated that young of the year were taken in mid-September 1882. Two skins collected by Turner are listed in the Museum collection, but we failed to find them.

Capella gallinago delicata (Ord). Wilson's Snipe

We saw four snipe, one on the meadows on upper False River on the 23rd, one lower down the stream on the 24th, and two at the mouth on the 25th.

Turner mentions a single male bird in early June at Davidson's Lake near Chimo, but we could find no specimen, nor is there any catalogue entry for the species.

Numenius phaeopus hudsonicus (Latham). Hudsonian Curlew.

Turner saw three birds at the mouth of the Koksoak in September 1882. This is the only record in his notes.

Numenius borealis (Forster). Eskimo Curlew

Turner's only mention of this bird recorded several large flocks flying over the mouth of the Koksoak on September 4, 1884.

Actitis macularia (Linnaeus). Spotted Sandpiper

A single bird was noted on the exposed mud flats at Chimo on August 20, and another at the mouth of the Koksoak on the 21st.

Turner considered it common at Chimo and collected both young and adults. We could not find the skins.

Tringa solitaria solitaria Wilson. Eastern Solitary Sandpiper

Turner took an adult male (No. 94483) on July 12, 1883, at Fort Chimo. It is still in the collection.

Totanus melanoleucus (Gmelin). Greater Yellowlegs

A single bird was found on one of the little rocky islets in the mouth of the Koksoak on the 21st, one on upper False River on the 23rd, and six on the shores of Ungava Bay on the 26th. We took one on August 21, and two on the 26th, all females.

Turner did not consider it common and took fall specimens only on the mouth of the Koksoak. One of the two catalogued, a female taken at the mouth of the river on September 19, 1882, was found.

Totanus flavipes (Gmelin). Lesser Yellowlegs

Turner saw one on October 8 about 50 miles above Fort Chimo on the Koksoak, but he did not collect it.

Erolia melanotos (Vieillot). Pectoral Sandpiper

Turner considered it common on the coast and stated that specimens were taken but none of these could be found.

Erolia fuscicollis (Vieillot). White-rumped Sandpiper

This was by far the most abundant bird on the coast. They frequented the tide pools and rocky islets by the thousand, and scattered individuals and small flocks were found wherever we went on the tundra. On the rocks they picked over the sea weeds and debris much like the Black Turnstones do on the Pacific Coast, while on the beaches and in tundra pools they behaved like other small sandpipers.

Turner evidently had the same experience as he considered it excessively abundant at the mouth of the Koksoak in July, August, and September. He took a number of specimens of which two taken August 2, 1884, and one August 20, 1882, at the mouth of the Koksoak are still in the collection.

Erolia minutilla (Vieillot). Least Sandpiper

This tiny peep was present in small numbers, but it was hard to detect in swarms of white-rumped and semipalmated sandpipers. It was noted each day from the 21st to the 26th in numbers ranging from one on the 23rd to over fifty on the 25th.

Fig. 3. Fort Chimo from the river.

Turner considered it uncommon, but believed that a few pair might breed at the mouth of the Koksoak. Of three skins catalogued as taken by Turner, we found one male collected at Fort Chimo on August 7, 1883.

Limnodromus griseus griseus (Gmelin). Eastern Dowitcher

This bird was hunted for rather persistently but only seen once. On August 23, five birds found on the meadows on upper False River acted more like a family party than as migrant birds. One of two birds taken from this flock was a juvenal male and the other a juvenal female. Aldrich who examined them considered them typical of the eastern race.

Turner considered it rare at Chimo and took specimens, one of which is still in the Museum. This bird, a female (No. 94471), taken at Fort Chimo on June 10, 1883, is also typically *griseus*.

Ereunetes pusillus (Linnaeus). Semipalmated Sandpiper

This species ranked next to the White-rumped Sandpiper in numbers. It frequented tundra pools, rocky islands, and rocky shore lines as well as the more conventional mud flat and beach habitat. It was noted commonly every day. We took three specimens on August 24.

Turner's statement that it occurs sparingly at the mouth of the Koksoak would not apply to the dates of our visit. We can add nothing to his opinion that it might breed as we were too late in the season. Two skins, a male taken August 19 and an immature female taken August 22, 1883, are still in the collection.

Crocethia alba (Pallas). Sanderling

Turner stated that he took specimens from a group of three at the mouth of the Koksoak, but we could find no skin in the collection and only one catalogue entry.

Phalaropus fulicarius (Linnaeus). Red Phalarope

Turner stated that it was rare in Ungava Bay, but that he obtained specimens. There is a single adult female (No. 100891) in the U.S. National Museum taken by Turner on June 18, 1884. It is labeled in his writing Fort Chimo, Ungava Bay.

Lobipes lobatus (Linnaeus). Northern Phalarope

Two flocks, consisting of about 25 individuals, were seen among the rocky islands at the mouth of the Koksoak on the 21st.

Turner believed that it bred on islands in Ungava Bay.

Stercorarius parasiticus (Linnaeus). Parasitic Jaegar

Four jaegars were seen chasing and being chased by Herring Gulls near a gull colony at the mouth of False River on the 22nd.

Turner secured one and saw several others in Ungava Bay in early July, but the specimen could not be found.

Larus hyperboreus hyperboreus Gunnerus. Eastern Glaucous Gull

A single immature bird on Whitefish Lake on the 19th, and two adults at the mouth of the Koksoak were the only ones seen.

Turner stated it was not rare, but that it did not breed. The Museum catalogue lists two skins only one of which could be found. It is a male taken at Chimo on December 18, 1882.

Larus marinus Linnaeus. Great Black-backed Gull

Two of these gulls were seen on the 22nd, and one on the 25th at the mouth of False River, and two along the shore of Ungava Bay on the 26th. Turner did not mention it.

Larus argentatus smithsonianus Coues. American Herring Gull

Both adults and immature birds were common on the coast and along the rivers and many were seen each day. A single downy young was found swimming away from an island in False River on the 22nd, and others were seen on shore. Well feathered juvenals still unable to fly swam away from another island farther upstream as we approached.

Turner considered it excessively abundant and collected both young and adults. Seven skins taken between June 10 and September 20 are still in the Museum.

Rissa tridactyla tridactyla (Linnaeus). Atlantic Kittiwake

Turner saw a single individual 100 miles up the Koksoak on October 13, 1883.

Sterna paradisaea Pontoppidan. Arctic Tern

Arctic Terns accompanied our boat whenever it was in Ungava Bay, ten to fifteen individuals being the usual quota. Large groups were about the islands at the mouths of the rivers, while others fed in the tide rips offshore. Many more juvenals than adults were present.

Turner found it breeding plentifully on the islands in Ungava Bay and collected both young and adults. We found a young male taken September 15, 1882, at the mouth of the Koksoak River, and an adult female taken at Chimo on August 19, 1883, still in the collection.

Uria lomvia lomvia (Linnaeus). Brünnich's Murre

There are two skins (Nos. 101169 and 100905) both adult males taken July 1 and July 6, 1884, labeled Fort Chimo, Ungava, in Turner's handwriting. Turner stated it was obtained only from Hudson Straits where it breeds, probably indicating that Fort Chimo is in this case a general rather than a definite locality designation. However, Turner frequently labeled skins "Ungava Bay", or "mouth of Koksoak", when taken at the river mouth.

Plautus alle alle (Linnaeus). Dovekie

Turner took a dovekie 100 miles up the Koksoak on December 19, 1882. This skin (No. 94568) is still in the collection.

Cepphus grylle mandti (Mandt). Mandt's Guillemot

We met an Eskimo boat at the mouth of the Koksoak on August 21. Dr. Jacques Rousseau, director of the Botanical Gardens at Montreal who was aboard, gave up a guillemot that had been collected that day northwest of the river entrance. We saw two and collected one in Ungava Bay on the 22nd on our way to False River and saw another bird on the return trip on the 26th. Two skins, a female (No. 100909) and a male (No. 100910) both labeled Fort Chimo in Turner's writing, are in the collection.

Bubo virginianus heterocnemis (Oberholser). Labrador Horned Owl

Turner considered this as a not rare resident at Chimo and obtained downy young on June 26, 1884, at Chimo. Two of these young males are still in the Museum collection together with two adult males taken at New Forks on October 10, 1882, and Chimo, February 28, 1883.

We saw only one owl and few other predators that depend on rodents for a food supply. This owl flew over the boat after dark as it lay in the mouth of False River and could not be identified.

Nyctea scandiaca (Linnaeus). Snowy Owl

Turner considered it a common breeder at Chimo. We found only one catalogue entry

for this species, and the skin, a female taken January 26, 1883, is still in the collection. Two others taken on the east coast of Labrador are also noted.

Surnia ulula caparoch (Müller). American Hawk Owl

Turner considered this a rare bird at Chimo, but found eggs June 8, 1884, and downy young nearly ready to leave the nest on June 26. A pair of adults taken May 2, 1883, and a young male taken June 26, 1884, all at Chimo, are in the collection.

Asio flammeus flammeus (Pontoppidan). Northern short-eared Owl

Turner recorded it as a common summer resident and states that downy young were obtained at Fort Chimo. No downies from this locality were found, but three skins, an adult male June 6, 1883, and an adult female September 17, 1883, and a young female October 7, 1883, all taken at Chimo, were found.

Colaptes auratus subsp? Yellow-shafted Flicker

Fragments of a Flicker with a label only partly legible were found. It is No. 94275, taken April 7, 1883, near Akpatok, Hudson Strait. The catalogue entry is Fort Chimo, and Turner's report states this bird was taken in October 1882. Perhaps there were two birds. If not, this species does not belong in this list.

Picoides arcticus (Swainson). Arctic Three-toed Woodpecker

Turner listed it as a common resident of the wooded portions of the district and collected specimens. One, a female taken at Forks, December 18, 1882, was found. We did not see any woodpeckers during our visit.

Picoides tridactylus bacatus Bangs. American Three-toed Woodpecker

Turner considered these as common as *arcticus* and collected more specimens. We found five specimens consisting of three females taken at Forks on December 21 and 23, 1882, and Chimo November 19, 1882, and two males taken at Chimo on November 14, 1882, and Forks, December 19, 1882.

Eremophila alpestris alpestris (Linnaeus). Northern Horned Lark

Horned larks were noted only on August 25 on lower False River. Johnny Angnetuk, our Eskimo skipper, brought one to the boat on that day that he had killed with a .22. When we were ashore later in the day, a second bird was collected and thirteen others observed.

Turner commented that it bred at the mouth of the Koksoak, and collected a number of specimens of which two males taken at Chimo on July 19, 1883, and July 23, 1884, are still in the collection.

Iridoprocne bicolor (Vieillot). Tree Swallow

Turner reported that it was common at "Big Island" in the Koksoak River where it bred abundantly. The only skin taken by him that could be found (No. 94290) was taken at Davis Inlet on the Labrador East Coast.

Perisoreus canadensis nigricapillus Ridgway. Labrador Gray Jay

A few "camp robbers" were found each day we were in the timber. As usual they responded well to squeaking and were more easily located than some other species. Each group consisted of adults and fully grown young. We saw two at Chimo on the 18th, six the next day between that post and Whitefish Lake, and four on False River. As we left the Hudson's Bay Post on the 28th, the last bird we saw was one of these jays perched on one of the anchor wires of the big flagpole. We also saw several near the airfield on August 29 and 30 while waiting for a plane.

Turner found it to be an abundant resident and took a large series during his stay. Forty-two skins representing both young and adults and taken every month of the year except July and August are still in the Museum. These as well as our skins are clearly of this race.

Corvus corax principalis Ridgway. Northern Common Raven

We saw only a single raven on our trip and that one flew across the Koksoak River as we neared Chimo on the 27th. Turner's experience was quite different. He considered it abundant and stated he saw nearly fledged young in a nest at Chimo on May 15. Ten of his skins are still in the collection, all taken between September 2 and March 17, except one young female taken on July 1, 1884.

Parus hudsonicus hudsonicus Forster. Hudsonian Chickadee

We saw this bird only around the airfield on August 29 and 30 where three birds were seen each day. Three specimens were taken.

Turner collected a large series, according to catalogue entries over forty, of which ten

taken between November 4 and April 13 were still available. Both his skins and our own seem clearly referable to this race.

Turdus migratorius nigrideus Aldrich & Nutt. Black-backed Robin

Robins were not numerous and those seen were the wildest land birds in the area. Two were noted at Chimo on August 18, five in the Whitefish Lake district on the 19th, two at Chimo on the 20th, one near the airfield on the 29th, and four on the 30th. Two of the three birds collected were in immature plumage, and the adult although not typical is nearest to *nigrideus*, according to Aldrich who kindly identified them. The seven specimens collected by Turner, all but one taken between May 27 and June 22, are *nigrideus*, according to the same authority.

Turner stated it bred abundantly at Chimo. Sixteen skins are catalogued, but only seven could be found.

Hylocichla minima minima (LaFresnaye). Northern Gray-cheeked Thrush

Turner stated that he found the nest and eggs of this bird at Fort Chimo on June 28, 1884. However, the only skin found was one taken at Davis Inlet on June 28, 1883, according to data on the tag in Turner's handwriting.

Regulus calendula calendula (Linnaeus). Eastern Ruby-crowned Kinglet

Two birds were seen in a spruce thicket about three miles north of the airfield on August 29, but no specimens were taken.

Hildebrand took two, one at George River July 25, 1948, and the other at Kopaluk on August 31, 1948. He commented that his records provided an extension of range northward, and ours is an addition to the Chimo list.

Montacilla alba Linnaeus. White Wagtail

Turner wrote that four individuals "were seen by Alex Brown and James Lyall of the Hudson's Bay Company on August 29, 1883, at Huntington Bay, four miles south of Chimo. These persons described the birds accurately, and declared they were the two parents and two young of the year. I might add that I place the fullest reliance on their assertion."

Anthus spinoletta rubescens (Tunstall). American Pipit

The pipit was the most widely distributed passerine bird in the area visited. Numerous individuals were seen each day scattered over the tundra, the rocky coast line, and rocky outcrops near Chimo. Specimens were taken on the 19th at Chimo.

Turner considered it an abundant breeder, and he took nests and eggs. Nine of the 22 specimens entered in the catalogue were found. These birds were taken between May 25 and September 22.

Lanius excubitor borealis Vieillot. Northern Shrike

We saw shrikes only in the vicinity of Chimo. Three were noted on August 18, four about Whitefish Lake on the 19th, and one flew into the open window of our room in the Hudson's Bay Company Post on the 21st. Three females were collected.

Turner stated that it was not common but breeds. He took young just able to fly at Chimo on June 30, 1884. One immature female, taken on September 4, 1883, and two males taken June 3, 1883, and May 14, 1884, were found.

Dendroica striata (Forster). Blackpoll Warbler

The Blackpoll Warbler was seen only twice. Six birds were noted on the shore of Whitefish Lake on August 19, of which two were collected, and two were observed near the airfield on August 30.

Turner found seven nests and eggs near Chimo and collected a considerable number of specimens of which twelve are still available. These birds were taken between June 8 and August 19. A young male taken on August 7 and a young female secured on August 5 are included.

Euphagus carolinus (Müller). Rusty Blackbird

Turner found it breeding at Chimo where young just from the nest were taken July 10, 1884. Two juvenals taken on that date are included in the six specimens found. The others were taken June 18, August 26, and September 2. It is odd that neither Hildebrand nor ourselves found this bird.

Pinicola enucleator leucura (Müller). Canadian Pine Grosbeak

Turner considered it abundant in summer, and stated that he took nests and eggs. Thirteen of the specimens catalogued were found. These were secured between April 13 and September 17 with some taken in each of the three summers covered by Turner's work. We did not see the bird, although a careful watch was kept for this species.

Acanthis hornemanni hornemanni (Holboell). Hornemann's Hoary Redpoll

Turner collected great series of redpolls, catalogue entries for about 440 having been checked with the possibility that a number were missed. One hundred forty-eight adult skins plus a number of juvenals were found.

Turner stated that this race which breeds north of Ungava was an abundant winter visitor which was absent from May 15 to September 1 each year. Forty-two adults taken at Chimo, fairly evenly divided between the two sexes, are clearly of this large race. These birds were taken between November 7 and May 5, and some were secured in each of the three winters of Turner's residence.

Acanthis hornemanni exilipes (Coues). Common Hoary Redpoll

Judging from the number of skins catalogued, this was the most abundant redpoll in the area. Eliminating a number of juvenals which cannot be assigned with certainty to either this race or *A. f. flammea,* forty-two adult skins of *exilipes* were available. Turner considered it an abundant resident which bred plentifully. He collected nests and eggs. The available skins were taken in every month except January, March, September, and October, but there are relatively few for the winter months. Twenty-five were secured in May, June, and July. A number of those collected in early May are still in winter plumage, but four males and three females are in somewhat worn breeding plumage. The white edgings to the feathers are largely or entirely gone, the tail feathers are frayed, very noticeably in a few, and wing feathers show some frayed edges.

During our visit redpolls were seen ferquently but were wild and difficult to approach. Redpolls in small flocks were seen at the airfield on arrival on August 18, at Whitefish Lake on the 19th, on the 23rd, 24th, and 25th on False River, and at the airfield on the 30th. Two of the three birds we secured are *exilipes* and the third *exilipes* x *flammea.*

Acanthis flammea flammea (Linnaeus). Northern Common Redpoll

Turner considered this an abundant resident which bred plentifully and collected nests and eggs. There are now available from Chimo nineteen adult males and eight adult females of this race. These were secured in May, June, and July, except one bird that has no date on the label, two taken March 25, and one on September 19. Four males and four females taken between May 20 and July 10 and one female taken on May 5 are in characteristic breeding plumage, all show abrasions and fraying of the tail and to a less extent of the wing quills as well as an almost complete loss of the white feather edgings.

There are eleven skins in the U.S. National Museum, and one of Gabrielson's that show some mixture of characters that might be treated either as hybrids between two species or as intergradations between two subspecies; with both forms breeding in the same area, the former seems to be correct.

Acanthis flammea rostrata (Coues). Greater Common Redpoll

Turner stated that this larger northern race was abundant in winter but absent from May 15 to September 1 of each year. Two males, nine females, and one skin without date or sex are available from Chimo. These birds were taken between November 15 and May 9, and show the least variation, particularly in the streaking on the rump of the four groups.

Loxia leucoptera leucoptera Gmelin. Common White-winged Crossbill

Turner found it abundant during the winter of 1882-83 and rare other winters. Twenty of the seventy-five skins catalogued were found. They were collected between November 21, 1882, and July 17, 1883. We did not see it at all.

Passerculus sandwichensis labradorius Howe. Labrador Savannah Sparrow

Savannah Sparrows were common on the meadows on False River on August 23, but were not noted elsewhere.

Turner found them common throughout the region and breeding at the mouth of the Koksoak. Three skins taken at Chimo, two on August 8, 1883, and one at September 4, 1882, belong to this race.

Junco hyemalis hyemalis (Linnaeus). Northern Slate-colored Junco

Two juncos in immature streaked plumage were feeding in a tiny clump of spruce near our quarters at the air base on August 30, and one was still in the same place the next morning. Turner did not mention the species.

Spizella arborea arborea (Wilson). Eastern Tree Sparrow

Tree Sparrows, including newly-fledged young and adults, were the most common bird in the willow and alder patches. They were present in numbers at Chimo, Whitefish Lake, the head of False River, and about the air base. Turner found it breeding commonly and took both skins and eggs. Seventeen skins, secured between May 22 and September 5, are still in the collection.

Zonotrichia leucophrys leucophrys (Forster). Eastern White-crowned Sparrow

This bird was second in abundance to the Tree Sparrow in the same habitat. Evidently a concentration of local birds or a group of migrants arrived on the 28th, since they were noticeably more numerous than on succeeding days.

Turner called it an abundant breeder, and there are nineteen skins in the collection taken by him between May 30 and September 17.

Melospiza lincolni lincolni (Audubon). Eastern Lincoln's Sparrow

Turner regarded this as a rare bird at Chimo and took only one specimen, a male on June 10, 1883. This bird reached the Museum and is catalogued as No. 94139, but the skin could not be found.

Calcarius lapponicus lapponicus (Linnaeus). Lapland Longspur

We did not see this bird until two were collected and others seen on False River on August 25. Evidently a group of migrants arrived as it was common the next day both on the tundra and the beaches of Ungava Bay.

Turner called it abundant at Chimo, and stated that it bred at the mouth of the Koksoak and on the islands of Ungava Bay. Five skins taken at Chimo between May 1 and 18 are still in the collection.

Plectrophenax nivalis nivalis (Linnaeus). Eastern Snow Bunting

Like the longspurs, the Snow Bunting was first noted on the 25th when two birds alighted on a rock beside our beached boat. A third was seen that evening many miles away on one of the islands in lower False River. It was common along the bay shore the next day.

Turner called it abundant at Chimo and stated that it bred on the islands in Ungava Bay and occasionally on the mainland. There are twenty-five of his skins from this area still in the collection taken between September 17 and May 3.

ADDITIONS AND ANNOTATIONS TO THE FLORA OF SOUTHAMPTON ISLAND, NORTHWEST TERRITORIES, CANADA [1, 2]

W. J. CODY

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DURING THE SUMMER of 1948 while working under the auspices of the Defence Research Board, the author made extensive plant collections in the vicinity of Coral Harbor, Southampton Island (64° 09' N. 83° 18' W.). Although particular attention was given to the vascular plants, a considerable number of mosses, lichens, fleshy fungi, rusts and smuts were also collected. A number of new and interesting records which were noted as this material was identified, are reported in this paper.

The history of botanical exploration in Southampton Island is fully described by Dr. Nicholas Polunin in "The Flora of Southampton Island, Hudson Bay", Journal of Botany. LXXVI: 93-103. 1938. The flora was again treated by Polunin in his "Botany of the Canadian Eastern Arctic, Part I Pteridophyta and Spermatophyta". Can. Dept. Mines and Resources. Nat. Mus. Can. Bull. 92 (Biol. Ser. 24) 1940, "Part II Thallophyta and Bryophyta". Can. Dept. Mines and Resources. Nat. Mus. Can. Bull. 97 (Biol. Ser. 26) 1947, and still later in his "Additions to the Floras of Southampton and Mansel Islands, Hudson Bay", Contr. Gray Herb. Harvard Univ. CLXV:

[1] Received for publication March 1, 1951.
[2] Contribution No. 1086 from the Division of Botany and Plant Pathology, Science Service, Department of Agriculture, Ottawa, Canada.

94-105. 1947. In his recent paper, "'Northwest Passage' plants in the Scott Polar Institute", Can. Field-Nat. 64 (1): 45. 1950, Polunin added another species to the known vascular flora of the Island. With this last addition he brought the known vascular flora of Southampton Island to a total of 169 species and 23 subsidiary entities. The additions listed below raise this total to 178 species and 27 subsidiary entities.

All the material, with the exception of the mosses which were identified by Dr. W. C. Steere, Stanford University, California, has been identified by members of the staff of the Division of Botany and Plant Pathology, Science Service, Department of Agriculture, Ottawa. Specimens are deposited in the herbarium of this institution.

Entities which are new to the flora of the Island are indicated with an asterisk (*).

ASCOMYCETES

**Myriosclerotinia vahliana* (Rostr.) Budw.; Coral Harbor, *Cody 1149;* new to Canadian Eastern Arctic.

**Paxina sulcata* (Pers.) Kze.; Coral Harbor, *Cody 1890;* new to Canadian Eastern Arctic.

**Sphaerospora trechispora* (Berk. & Br.) Sacc.; Coral Harbor, *Cody 1603.*

BASIDIOMYCETES

Uredinales

**Chrysomyxa ledicola* (Pk.) Lagerh. On *Ledum palustre* L. var. *decumbens* Ait.; Coral Harbor, *Cody 1359* and *1291;* new to Canadian Eastern Arctic.

**Chrysomyxa pyrolae* (DC.) Rostrup. On *Pyrola grandiflora* Radius; Coral Harbor, *Cody 1133.*

**Melampsora arctica* Rostrup. On *Saxifraga oppositifolia* L.; Coral Harbor, *Cody 1073.*

**Melampsora hirculi* Lindr. On *Saxifraga hirculus* L.; Coral Harbor, *Cody & Senn 1329;* new to Canadian Eastern Arctic.

**Puccinia arenariae* (Schum.) Wint. On *Cerastium alpinum* L.; *Cody 1552.* On *Cerastium beeringianum* C. & S.; *Cody 1528.* On *Stellaria humifusa* Rottb.; *Cody 1530.* On *Stellaria laeta* Rich.; *Cody 1379;* all from Coral Harbor; new to Canadian Eastern Arctic.

**Puccinia bistortae* (Str.) DC. On *Polygonum viviparum* L.; Coral Harbor, *Cody 1620.*

**Puccinia drabae* Rud. On *Draba cinerea* Adams; Coral Harbor, *Cody 1659.*

**Puccinia eutremae* Liro. On *Eutrema edwardsii* Br.; Coral Harbor, *Cody 1907.*

**Puccinia heucherae* (Schw.) Diet. On *Saxifraga cernua* L.; Coral Harbor, *Cody 1593.* On *Saxifraga nivalis* L.; Coral Harbor, *Cody 1391;* new to Canadian Eastern Arctic.

**Thekopsora vacciniorum* Karst. On *Vaccinium vitis-idaea* L. var. *minus* Lodd.; Coral Harbor, *Cody 1357;* new to Canadian Eastern Arctic.

**Uromyces lapponicus* Lagerh. On *Oxytropis hudsonica* (Greene) Fern.; Coral Harbor, *Cody 1967.* On *Oxytropis maydelliana* Trautv.; Coral Harbor, *Cody 1128 and 1323.*

Ustilaginales

**Cintractia elynae* Syd. On *Kobresia simpliciuscula* (Wahl.) Mack.; Coral Harbor, *Cody 1795 and 1821;* new to Canadian Eastern Arctic.

**Entyloma compositarum* Farl. On *Erigeron unalaschkensis* (DC.) Vierh.; Coral Harbor, *Cody 1566;* new to Canadian Eastern Arctic.

**Tilletia cerebrina* Ell. & Ev. On *Deschampsia brevifolia* R. Br.; Coral Harbor, *Cody 1840;* new to Canadian Eastern Arctic.

Agaricales

**Laccaria tortilis* (Bolt.) Bond; Coral Harbor, *Cody 1626 and 1910;* new to Canadian Eastern Arctic.

MUSCI

**Ceratodon purpureus* (Hedw.) Brid.; Coral Harbor, *Cody 1628.*

**Pottia latifolia* (Schwgr.) Chr. var. *pilifera* (Brid.) Chr.; Coral Harbor, *Cody 1193.*

**Desmatodon suberectus* (Hook.) Limpr.; Coral Harbor; *Cody 1580.*

Funaria polaris Bryhn; Coral Harbor, *Cody 1075;* previously reported by W. C. Steere, Bryophyta of Arctic America III. The rediscovery of *Funaria polaris* Bryhn. The Bryologist 52 (1): 29-31. 1949.

**Tetraplodon mnioides* (Hedw.) Bry. Eur.; Coral Harbor, *Cody 1286, 1185, 1625, 1216, 1220.*

**Bryum wrightii* Sull. & Lesq.; Coral Harbor, *Cody 1072, 1184.*

HEPATICAE

Marchantia polymorpha L.; Coral Harbor, *Cody 1156, 1790, 1654;* Polunin cites a Lyon ex Hooker record 'Southampton Island or near'. The presence of this species on the island is now firmly established.

PTERIDOPHYTA

**Woodsia glabella* R. Br. This small fern was found scattered in small patches in shallow soil among boulders on the igneous ridge on the east bank of the Kirchoffer R. between the falls and the mouth of the river; *Cody 1368.*

Cystopteris fragilis (L.) Bernh. Reported by Polunin from Duke of York Bay and Noksaruak; a number of plants were found scattered among boulders of a large igneous outcrop several miles north of the airstrip at Coral Harbor; it was also found to be locally abundant, among boulders of the igneous ridge on the east bank of the Kirchoffer R. south of the falls; *Cody 1367 and 1292.*

SPERMATOPHYTA

**Potamogeton fuliformis* Pers. var. *borealis* (Raf.) St. John. Very common in some pools, while totally absent from others, in the wet sedge-grass meadow area lying behind the beach at Munn Bay; the plants which were rooted in ooze in 2"-3" water were collected in both flowering and fruiting stages; *Cody & Senn 1330, Cody 1519 and 1713.* These collections represent a northern extension of the range of this species in the Eastern Canadian Arctic, the only other collections in the region being at Cape Smith in northern Quebec, Rankin Inlet on the west coast of Hudson Bay and Frobisher Bay, Baffin Island.

**Arctagrostis latifolia* (R. Br.) Griseb. — a number of collections which approach var. *longiglumis* Polunin should be noted. It was first collected on July 25, in a small sedge meadow in the limestone gravel plain to the west of the camp area at Coral Harbor; later it was located in moist very gravelly soil north of the airstrip and in a dried up sedge meadow in a granitic area about a mile west of the airstrip; *Cody 1558, 1783, 1578 and 2009.*

**Puccinellia angustata* (R. Br.) Rand & Redfield. — a collection from the sand beach at Munn Bay is being referred to what Polunin includes in his "unsavoury aggregate". The plants were in clumps, with the stems flattened to the sand in which they were rooted; *Cody 1523.*

**Eriophorum brachyantherum* Trautv. — A single collection of this species, which is here reported from the Eastern Arctic for the first time, was made on an igneous ridge near the falls on the Kirchoffer R., where it was growing in muck at the edge of a small pool; *Cody 1364.* This species is readily differentiated from *E. callitrix* Cham. to which it is closely related, by its less inflated sheaths which are situated above the middle of the culm, and the slightly tawny bristles.

Stellaria laeta Rich. (*Stellaria longipes* sensu Polunin pro parte). Fairly common in rich soil over gravel near the beach at Munn Bay, and also in shallow soil over rocks around an old Eskimo habitation at the mouth of the Kirchoffer R.; *Cody 1101 and 1379.*

**Stellaria monantha* Hulten var. *monantha* (*Stellaria longipes* sensu Polunin pro parte). Fairly common on the gravel beach at Munn Bay; a small collection was also made from hummocks in a sedge meadow about a mile north of the airstrip; *Cody 1733 and 1213.*

Specimens of the *Stellaria longipes* group have been identified according to Hulten. '*Stellaria longipes* Goldie and its allies'. Botaniska Notiser 1943: 251-270.

**Arenaria ? elegans* R. & S. Two small collections, one from moist sandy soil over gravel on the upper beach at Munn Bay and the other from a mossy hummock at the edge of a sedge meadow on the limestone gravel plain to the east of the airstrip, seem to be referable to this species; *Cody 1231B and 1855.*

**Ranunculus codyanus* Boivin. Found in only one pond in the wet sedge-grass meadow area behind the beach at Munn Bay; in muck around the edge of the drying up pool and rooted in ooze in water up to 3 inches in depth; *Cody 1712* (type) and *1518* (paratype); see Boivin, Can. Field-Nat. 65 (1): 3. 1951.

**Ranunculus trichophyllus* Chaix var. *eradicatus* (Laest.) Drew. This inconspicuous little plant was first noted floating in about 6 inches of water, attached to the gravelly bottom of a small lake on the limestone gravel plain to the west of the camp area. The lake was, with the exception of a few scattered plants of *Senecio congestus* and a small stand of *Carex* spp., completely void of vegetation. No flowers or fruit were observed at the time. Upon returning to the spot on August 5, about 10 days later, the water had completely disappeared and plants in both flowering and fruiting condition were found lying prostrate on the moist gravel. This species was not noted elsewhere in the area; *Cody 1841.*

Draba crassifolia Graham. Polunin reported a doubtful specimen from South Bay; a col-

lection from sandy limestone gravel near the beach at Munn Bay is referred to this species; *Cody 1945.*

**Draba rupestris* R. Br. Two collections of this species, one in flower and early fruit, and the other in fruiting condition, were made from moist sandy limestone gravel of the creek bed to the southwest of the camp area at Coral Harbor; *Cody 1204 and 1656.*

Arabis alpina L. Reported by Polunin from the Nuvoodlik Hills and Cape Low; specimens were collected from crevices of the limestone banks of the creek which flows southward to the west of the camp area; *Cody 1565 and 2022.* This species was not noted elsewhere in the area.

**Saxifraga oppositifolia* L. forma *albiflora* (Lange) Fern. Southampton Island Post, *Eva Beckett s.n.,* 16 Aug. 1949, Herbarium of C. E. Garton, *4116,* Port Arthur, Ont.

Pedicularis sudetica* Willd. forma **alba forma nova — a forma typica differt corollis albis. Found with the typical form in a shallow stream-bed which ran through a wet sedge meadow on the limestone gravel plain about half a mile east of the camp area at Coral Harbor; *Cody 1352A* (type).

Pedicularis lanata* Cham. & Sch. forma **alba forma nova — a forma typica differt corollis albis. Found with the typical form in shallow soil over igneous rock about halfway between the end of the old airstrip and the Kirchoffer R., and again with a *Dryas integrifolia*-lichen association in shallow soil over igneous boulders near the coast at Munn Bay; *Cody 1146* (type) and *1249* (paratype).

Antennaria ekmaniana A. E. Porsild (*A. labradorica* sensu Polunin). Three collections of this species were made: near the falls on the Kirchoffer R., about three miles north of the airstrip, and one mile west of the airstrip; all the specimens were found in shallow soil over igneous rock; *Cody 1360, 1287 and 1805;* previously reported from White Island in District 9 of Polunin's Canadian Eastern Arctic.

Senecio congestus (R. Br.) DC. (*S. palustris* (L.) Hook. var. *congestus* (R. Br.) Hook). The variety *palustris* (L.) Fern. (*S. palustris* (L.) Hook.) has already been reported from South Bay by Polunin. A collection of this variety was made along the moist sandy beach at Munn Bay; *Cody 1880.* The typical variety although reported from York Bay and nearby Walrus Island, was noted for the first time from the Coral Harbor area where it occurred in moist sand along the shoreline at Munn Bay and also around one pond in the limestone gravel plain to the west of the camp area; *Cody 1098, 1514, 1238* (in flower) and *1839* (in fruit).

THE CHANGING STATUS OF THE RED-NECKED GREBE IN SOUTHERN ONTARIO [1]

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IT HAS BECOME evident in recent years that the status of the Red-necked (Holboell's) Grebe, *Colymbus grisegena,* is now markedly different in southern Ontario to what it was 45 years ago when Nash (1905) wrote: "A regular, but never a common, spring and autumn visitor to the waters of southern Ontario".

As Nash indicated, it has evidently long been the normal practice for small numbers of this species to use the lower Great Lakes system as an intermediate stopping-place during spring and fall migration between the wintering range on the Atlantic seaboard and the breeding grounds on the Prairies.

However, modifications in this procedure have become manifest in at least three forms: — 1) individuals of this species numbering into the hundreds now regularly remain along the north shore of western Lake Ontario throughout the summer season; 2) although many of these individuals are presumably non-breeding birds, a number of breeding records have now been established in this area in the past seven years; 3) there has been an increase in the number and, in some cases, the size of flocks now regularly found during late summer and autumn in certain relatively restricted sections of Lake Ontario and Lake Simcoe, Ontario.

1) Received for publication November 14, 1950.

The first breeding records for Lake Ontario were recorded by Speirs, North and Crosby (1944) when they described the nesting of several pairs at Burlington, at the western end of Lake Ontario, in 1943 and 1944. In 1946, Mr. North found a pair nesting at Lorne Park, west of Toronto. The Burlington and Lorne Park areas now appear to be occupied by increasing numbers of this species throughout the summer. From the observations of Saunders (1947) and others, it is evident that there are about 100 or more at Lorne Park during this season, while a count of 101 on July 3, 1949, at Burlington has been recorded by Baillie (1949).

Baillie (1949) also mentioned autumn concentrations of the Red-necked Grebe at Port Britain, on Lake Ontario, and at Barrie, on Lake Simcoe.

The Port Britain concentration is normally the largest one in the entire region. Actually, it takes place a short distance offshore from Willow Beach, near Port Britain and about three miles west of Port Hope, on the north shore of eastern Lake Ontario. Much information concerning the recent history of this assemblage has been provided by Mr. Harold Reeve, a farmer-naturalist whose property borders on the lakeshore at this particular spot. He has observed the flocks here since he first became interested in wild life studies in 1941, but remembers them as occuring regularly as far back as 1923.

Observations made in the last six years show that the first birds usually arrive there late in July. Their numbers then gradually increase to a peak of about 400 to 1,000 by the end of September or early October. This figure diminishes gradually, with the last birds leaving in late November, or occasionally in early December. The greatest number Mr. Reeve has ever observed was on September 6, 1945, when the lake in front of his property was literally black with Red-necked Grebes, their numbers being conservatively estimated at upwards of 3,000. Surprisingly, Mr. Reeve reports only two spring occurrences (both of individual birds) of this species at Willow Beach, so that it is apparent that this location is frequented by the species only in the late summer and autumn.

Some dates and figures regarding the occurrence of the Red-necked Grebe at Willow Beach during the past four years are presented in Table I.

TABLE I
SOME FIGURES ON THE OCCURRENCE OF THE RED-NECKED GREBE AT WILLOW BEACH, LAKE ONTARIO, IN THE YEARS 1947-1950

Date		Estimated numbers
1947	August 25	75
	September 18	600-800
	Early October	1,000
	October 15	835
	October 19-24	750-850
	October 26	400
1948	September 25	550
1949	July 27	7
	Early October	400
	November 20	last left
1950	Mid-August	20
	Early October	600
	October 29	300

During the day, the birds seldom stray from a rectangular area about half a mile or less in length and one quarter of a mile in width, the nearest birds usually being about 300 yards offshore. The area occupied is greatest when the water is glassy calm and least when a heavy swell is running. It is probable that the birds do most of their feeding in the early morning, since during the remainder of the day they appear to do little but preen and rest. They are very rarely seen to fly. On a rough, cold day, small flocks may take wing and fly a few yards, but even this is infrequent.

Just what makes this particular location so attractive to the grebes has been a matter of some speculation. The situation lies in a rather shallow bay, about 1.5 miles long and half a mile deep. The shore is a pebbly beach with no emergent aquatic vegetation. The depth of the water in the favoured location, about one-third of a mile offshore, is about 20 feet. To sample the bottom in this area, Mr. Reeve used a weighted net. The haul was found to consist almost entirely of an abundance of aquatic algae of the family Characeae (Muskgrass).

To determine what food the birds were obtaining, attempts were made to collect a few individuals in order that stomach analyses might be made. This proved surprisingly difficult, as the birds kept out of shotgun range, and in 1948 these attempts met with failure. However, in 1949, Mr. Reeve was eventually able to collect one bird and the stomach was brought to the Royal Ontario Museum of Zoology for analysis of contents.

The analysis was made by Mr. Victor Williamson, Mr. J. L. Baillie and the writer. The contents (13 c.c.) proved to be about 95% feathers and 5% parts and fragments of arthropod exo-skeletons. Microscopic examination showed no definite vegetative particles.

This analysis conformed with a study by Wetmore (1924) who examined 46 stomachs from birds taken at different points across North America and at different times of the year. Ten of these 46 stomachs contained feathers only, and feathers made up 70% of the total volume of the remainder. Of the remaining material, 97% was animal matter and 3% vegetable matter. The former was composed of fish, crustacean and insect material in that order of importance; the vegetable matter was considered incidental.

Until more definite evidence is secured, it may be surmised that the abundant growth of Characeae at Willow Beach in late summer and autumn provides a favourable habitat for quantities of insects and crustaceans which in turn provide food for the grebes.

The other late summer and autumn concentration point mentioned by Baillie (1949) is situated in Kempenfeldt Bay, Lake Simcoe, about 50 miles north of Toronto. This was first recorded by Devitt (1943), 35 birds having been seen there in October, 1939, but in the last ten years the numbers reported from this area have been steadily increasing, and the peak October figure is now about 300.

Dr. J. M. Speirs has recently found a previously unrecorded autumn concentration point at Pickering Beach, on Lake Ontario, some 25 miles east of Toronto. About 500 Red-necked Grebes were seen there by him on September 28, 1949. The relatively large size of this flock may account for the reduced numbers seen at Willow Beach in 1949. In September and October, 1950, an estimated 300-400 birds were observed at Pickering Beach by Dr. Speirs.

On Lake Erie, the Red-necked Grebe is still a relatively rare spring and fall visitor, and its status there remains much as it was in Nash's time. However, in view of the recent records from Lake Ontario, observers might well watch for an increase in the number of this species visiting Lake Erie.

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BIRD OBSERVATIONS AT CHESTERFIELD INLET, KEEWATIN, IN 1950 [1]

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INTRODUCTION

THE WRITER was at Chesterfield Inlet, Keewatin, from 6 May to 2 Sept., 1950, engaged in botanical work under the sponsorship of the Defence Research Board. Considerable time was given to bird study until late June, after which botanical work allowed only relatively casual observations. Thus the data for spring migration and courtship are fuller than those for incubation, young, and fall migration.

The settlement of Chesterfield Inlet is at 63° 21' N, 90° 42' W, on a bay on the south side of the south headland of the Inlet mouth. The country consists mainly of low, barren hills of granite gneiss that have been very severely glaciated. The highest point within walking distance of the settlement is about

[1] Received for publication December 21, 1950.

90 ft. above high tide level, and there are no appreciable cliffs. The valleys, where not filled by lakes, consist largely of *Carex* marsh with small amounts of sphagnum bog. Sand and gravel ridges, indicating various post-glacial sea levels, support a sparse lichen-heath tundra or, if well watered, a sod of grasses and sedges. Dwarf birch, *Betula glandulosa*, and most willows, *Salix* spp., are prostrate to about 6 in. high; but a few willows generally attain 18 in. and *S. alaxensis* rarely reaches 4 ft. where snow cover is exceptionally good. Many ponds and small lakes and countless small pools occur. There are numerous very small creeks, but none of any size. The shores are largely rock, interspersed with beaches of moraine boulders or mixed sand and clay. The beaches are extremely rich in plant and animal life. A dense growth of *Fucus* and other algae marks the low-tide zone and great beds of kelp occur in deeper water. Seaweed is piled 6 in. to 2 ft deep along most beaches. These piles harbour great numbers of fly larvae and pupae, which supply much of the food of the shore birds in spring migration. Molluscs, starfish, small crustaceans, etc., abound on the tide flats.

The observations recorded below are generally those of the writer, but the other members of the party, Mr. J. R. Vockeroth, Mr. J. G. Chillcott and Mr. C. T. Watts are responsible for some data on spring migration and numerous nesting records. Mr. Watts, in particular, found many nests. The specimens collected are in the National Museum of Canada. The writer is indebted to Mr. W. Earl Godfrey for advice in preparation of this report.

MIGRATION

Chesterfield Inlet, but for the sizeable settlement, which is a deterrent to some of the large birds, is probably representative of much of the northwest coast of Hudson Bay; but it is not a good point to observe migrating birds. It is thought that many birds, including swans, geese, shore birds and terns, fly directly between Baker Foreland and Cape Fullerton or even between Cape Churchill and Cape Fullerton. On 2 Sept., when the writer was a few miles east-northeast of Marble Island en route to Churchill, a flock of 15 arctic terns was seen travelling almost exactly northeast and a flock of 10 white-rumped sandpipers passed to the southwest. A northeastward projection from the point of observation leads close to Cape Fullerton. The scarcity of the larger shore birds at Chesterfield was notable.

The spring was unusually late both at Chesterfield Inlet and for a long distance to the north. This condition resulted in an apparent reversed migration among several birds, including whistling swans, snow, blue and Canada geese, and pomarine jaegers. The fact that more of these birds were seen southbound than northbound early in the season is most simply explained by presuming that they flew north off shore, found conditions too retarded for feeding, and worked back along the coast in search of open ground. Mr. Wm. Browney, manager of the Hudson's Bay Company's post, recollected similar reversed migration farther down the coast, and was of the opinion that a considerable proportion of such birds never did go north again but nested in the area to which they had been forced back. Such a situation adds to the difficulty of defining the limits of breeding ranges. Birds that went north again must have bred very late, and it may be presumed that their fall migration was also late in consequence.

POPULATION DENSITY OF BREEDING BIRDS

Nothing in the nature of an orthodox breeding census could be undertaken; but many nests were found in the area near the settlement, which was covered regularly, and it was possible to make quite close estimates of numbers for such species as Hoyt's horned lark, Lapland longspur and snow bunting, which maintained fairly definite territories. Four square miles, consisting of the apical part of the headland, was selected as a census area. This area included the settlement and was all traversed regularly in the course of other work. Table 1 gives the estimated breeding population of this area. Proof of breeding within the census area was obtained for all species in the table except the pintail. Other species known to breed within 5 miles were the Pacific loon, king eider and black guillemot. Selection of an area farther inland, had it been feasible, would presumably have excluded the semipalmated plover and arctic tern and reduced the snow bunting, which was predominantly at the settlement; and might have introduced or increased several large birds.

The census area included one lake about ¾ by ¼ mile and a number of large ponds, with a total area of about 0.6 square mile. The extensive areas of almost completely bare rock were roughly estimated to total 1.5 square miles. The estimated total number of breeding pairs for the 4 square miles was

TABLE 1. ESTIMATED NUMBER OF PAIRS OF BREEDING BIRDS IN FOUR SQUARE MILES AT CHESTERFIELD INLET, 1950

Species	Number of pairs
Red-throated Loon, *Gavia stellata*	6
Pintail, *Anas acuta tzitzihoa*	3
Old-squaw, *Clangula hyemalis*	15
Hudson Bay eider, *Somateria mollissima sedentaria*	5
Rock ptarmigan, *Lagopus mutus rupestris*	15
Semipalmated plover, *Charadrius hiaticula semipalmatus*	7
Red-backed sandpiper, *Erolia alpina pacifica*	2
Semipalmated sandpiper, *Ereunetes pusillus*	20
Red phalarope, *Phalaropus fulicarius*	1
Northern phalarope, *Lobipes lobatus*	2
Parasitic jaeger, *Stercorarius parasiticus*	2
Herring gull, *Larus argentatus*	4
Arctic tern, *Sterna paradisaea*	25
Hoyt's horned lark, *Eremophila alpestris hoyti*	120
American pipit, *Anthus spinoletta rubescens*	16
Lapland longspur, *Calcarius lapponicus lapponicus*	320
Snow bunting, *Plectrophenax nivalis nivalis*	52
Total	615

615, equivalent to 24 breeding pairs per 100 acres or 4.8 breeding individuals per 10 acres. This figure is higher than Nicholson's 2.8 adults per 10 acres for tundra in Greenland, but lower than Soper's 6.1 and 8.5 for grass tundra in Baffin I. (figures from Hickey, 1943).

PHENOLOGY

As an approximate guide to the progress of the season, flowering dates for a few widespread and well-known plants are given in Table 2. The first date column is extreme early anthesis, regardless of exposure; the second is the first day of appreciable bloom, which perhaps is a better indicator for some species that start irregularly but is inapplicable to others that show a steady increase in bloom. This second date is probably closest to the one that would be recorded by those not actively studying the flora.

ANNOTATED LIST OF BIRDS OBSERVED

1. Pacific Loon

Gavia arctica pacifica.—Not common, but two breeding records obtained. A pair seen 8 miles south on 16 Aug. had one stubby-billed young about ⅔ grown; one gave a low *aowurr*, apparently of warning. First noted 25 June when one was seen on a nest at the edge of a grassy islet in a lake 3 miles southwest of the settlement. Herring gulls made a nest 20 ft. away on this islet, but apparently did not occupy it. On 15 July the ice had melted and the water had dropped enough to allow this nest to be visited with hip waders. Mr. Chillcott waded out and was attacked by

TABLE 2. PHENOLOGICAL MARKERS AT CHESTERFIELD INLET, 1950

Species	Extreme early anthesis	First date of appreciable bloom
Saxifraga oppositifolia	22 June	29 June
Arabis arenicola	3 July	4 July
Saxifraga tricuspidata	4 July	10 July
Papaver radicatum	5 July	10 July
Oxytropis bellii	9 July	11 July
Rhododendron lapponicum	13 July	15 July
Ledum palustre v. *decumbens*	15 July	18 July
Matricaria inodora	18 July	
Chrysanthemum arcticum	28 July	

gulls before reaching the islet, but found the gull nest empty. He then approached the loon's nest and the sitting bird slid into the water. The gulls at once turned their attention to the loon and dived on it almost continuously during the next 15 minutes. The loon put on a remarkable performance to draw attention from the nest. Its antics suggested a mixture of alarm, injury feigning and courtship. The commonest sequence was for it to dip its bill into the water, raise the head high and call a low *burr-ru*. It often flapped along the water with head lowered, as though unable to fly. Early in the display it several times arched its neck until the bill almost touched the upper breast and reared up on feet and tail, using its wings to lift itself almost out of the water; the thick neck, when arched, curiously suggested a cobra's hood. It several times gave a moaning *owuh* just audible at 50 yards. It made several short dives, preceding one by a sharp yelp; and eventually made a few short flights when the herring gulls left it alone briefly. Mr. Watts later waded out and found the eggs to measure 75 by 45 and 74 by 46 mm. These birds seemed generally to be quiet, but their courtship was never observed.

2. Red-throated Loon

Gavia stellata.—Moderately abundant. Arrived about 15 to 18 June. Almost certainly bred in considerable numbers, but extremely wary and proof of breeding was not obtained until a pair of young were found on 23 Aug. The young and the female parent were collected and weighed 935 g., 992 g. and 1502 g. respectively. The young then had the head feathered, the flight quills emerging and the body feathers coming in beneath the heavy down. She-nee-tuk, an observant Eskimo who guided and interpreted for us, said this is always the last bird to nest except perhaps the guillemot. The red-throated loons for some hundreds of miles along this coast, and, according to Mr. Jack Martin, as far north as Repulse Bay, never give the quavering *ha-ha-ha-ha-ha* flight call familiar elsewhere. Instead they give a duck-like *kark kark kark kark kakarark kakarark*, etc. Bray (1943) also records this call from parts of the arctic archipelago. The quavering call replaces it a relatively short distance inland. Dr. J. P. Moody encountered the "kokshow" (confirmed by Shee-nee-tuk as this species) giving the quavering call 70 miles up the inlet. His canoe-man, an inland (Padleimut) Eskimo, tried to drive the bird away in accordance with his superstition that this call brings rain.

The birds at Chesterfield have a hideous mating call, audible at fully a mile, that they give for a minute or more on end throughout the summer; it is most nearly rendered as *gayorwórrk*. Not until 10 August was the accompanying display seen, so wary were these birds. One bird started swimming round the second while both tipped their bills up at 45°. Soon the circling bird broke into the mating cry and swam about irregularly, arching one or both wings. After one minute both

birds resumed bill-tipping for another minute; they then saw the observer and flew silently off.

3. Whistling Swan

Cygnus columbianus.—Four were seen flying southwest on 27 May, and 9 flying northeast later in the same day. Three immature birds were seen at Fairway I. on 1 July. A prospecting party reported a pair with young about 20 miles south, which suggests that the species might breed at Chesterfield but for the settlement.

4. Canada Goose

Branta canadensis.—From 21 May to 14 June most birds seen were flying south or southwest. From 15 to 29 June they flew about erratically. On 30 June and 4 and 7 July one to several strings were seen flying north or northwest. Only one string was seen in fall migration, on 16 Aug.

5. Snow Goose

Chen hyperborea.—Strings seen on 6 days from 2 to 11 June flew southwest or occasionally west. From 15 to 29 June on 7 days directions were random. This species outnumbered the next about 3.5 to 1 in limited counts.

6. Blue Goose

Chen caerulescens.—A few were seen on 7 days always with snow geese.

7. Black Duck

Anas rubripes.—One passed within 30 yards of Mr. Watts and the writer on 9 July under favourable conditions that eliminated all doubt as to its identity.

8. Pintail

Anas acuta tzitzihoa.—Seen almost daily from 10 June to 19 July and sporadically thereafter. Probably bred, but very alert and difficult to approach. More numerous at the end of August as though migrating.

9. American Golden-eye

Bucephala clangula americana.—Flocks of 7 to 19 seen frequently from 2 to 22 July; mostly adult males, but several females or year-old males among them.

10. Old-Squaw

Clangula hyemalis.—About 55, more than half males and predominantly into breeding plumage, appeared off shore on 2 June. From 8 June onward they dispersed about the ponds as open water increased. The Eskimo name "anhunga" expresses the commonest courtship call, *ah-ahoong-ah,* of the drake, given with an upward toss of the head. The female occasionally replied with a single soft, low note. Nearly all birds were paired by 18 June. A nest with 6 eggs and abundant down was found beside a brackish pond on 7 July. Mr. Chillcott found a nest in a rock cleft at the top of a barren hill 200 yds. from any pond. When found early on 21 June this nest contained 7 eggs but almost no down and the female was sitting. Two days later two eggs had disappeared, perhaps having been cracked on the duck's hasty departure when the nest was first found, and removed by her. This nest eventually contained a moderate amount of down. The 5 remaining eggs hatched between noon 20 July and noon 21 July, giving an incubation period of at least 29½ days. Kortright (1943) gives the incubation period as about 3½ weeks. Possibly hatching was retarded in this instance by cool weather and sparse down. This female was easily photographed from 6 ft. Members of a prospecting party told of touching a sitting bird away from the settlement where they are perhaps even tamer.

From 22 July onward many broods were seen. Clutch size cannot be judged from the broods, which ranged up to 15. Broods seem to mix and unite freely. Broods of 7 and 3 seen on a pond were herded into a bay for closer inspection; they mixed and separated as 8 and 2, mixed again and all followed one female, the other swimming off alone but apparently unconcerned. On 30 July young about a week old dived for several seconds. When approached the young skittered over the water using wings alternately. In early August the broods at various ponds changed bewilderingly. It is clear that the young easily make overland journeys of at least ¼ mile. On 8 Aug. the largest young, slightly over half the female's length, made feeding dives of 13 seconds. On 13 Aug. they were losing the white chin patch. On 18 Aug. advanced young, probably 3½ to 4 weeks old, were about three-quarters the length of the female. On 20 Aug. the white cheek patch was becoming plain and the chin patch had virtually gone; when approached they skittered over the water beating wings in unison and nearly flying. By 24 Aug. advanced birds were hard to tell from females and were seen in salt water for the first time. Flocks were forming in the bay by 26 Aug.

11. Hudson Bay Eider

Somateria mollissima sedentaria.—All drakes seen clearly were definitely not the northern eider, *S. m. borealis,* and so presumably were this race. A female taken on 15 June weighed 2127 g. (4 lb. 11 oz.), just over the greatest weight for a male and much more than that for any female of *S. m. dresseri* recorded by Kortright (1943), who gives no weights for the northern races. Kortright's distribution maps show Chesterfield Inlet as the dividing line between *S. m. borealis* and what is now recognised as *S. m. sedentaria,* but our observations suggest that the line is farther north or inconstant.[2]

First seen on 15 May, the first day of open water close to shore. Started to come to ponds on 10 June. Nests were seen with 5 and 6 eggs and several broods had 3 to 5 young. Young on 20 July, a few days old, dived 2 to 3 seconds in trying to hide. On 31 July a female with 5 young was surprised on the near side of a large pond; she kept submerged except for occasional glimpses of her bill and led the brood to cover on the far shore. On 7 Aug. probably the same brood, now half as long as the parent, made repeated dives of 10 to 18 seconds, when pressed, and all used the device of taking a fresh breath with only the bill showing. They were watched from a high rock and definitely swam with the feet only; the wings sometimes trailed slightly and were apparently used as planes to control depth but never for propulsion under water. Three were surprised in very shallow water on 8 Aug.; 2 skittered out into deeper water with wings splashing alternately, while the third tried to dive and swam along breaking surface. No further close observations were possible as most broods were by then in salt water.

12. King Eider

Somateria spectabilis.—Seen in small numbers regularly from 12 June to 16 July; then onset of eclipse made recognition difficult, but a male on 16 July seemed to be still in full breeding plumage. Courtship note a soft, dove-like *oooh oooh* much like that of *S. mollissima.* One nest with 7 eggs and abundant down was found 3 miles southwest of the settlement and one with 6 eggs on Fairway I. This species seemed shyer than the last.

[2] Snyder (1941, Roy. Ont. Mus. Zool., Occas. Papers, No. 6, p. 7) extends the range of **S. m. sedentaria** north to Cape Fullerton. — Orn. Ed.

13. Gyrfalcon

Falco rusticolus obsoletus.—A single very dark bird was seen at the settlement on 27 and 30 Aug. It was chased at least twice by arctic terns. Once at low tide it dived from inland and shot out over the tide flat at tremendous speed, but the terns gave alarm, the sandpipers scattered, and it went across the bay and out of sight.

14. Peregrine Falcon

Falco peregrinus anatum.—One seen regularly about the settlement from 21 May to 20 June. It once rose from a herring gull carcass partly buried in the snow; it had apparently torn at the breast but had not eaten any appreciable amount. See also under Golden Plover. On 22 June one was seen 2 miles northwest near an old nest of willow branches on a rock ledge, which may have been built by this species; but no positive breeding evidence was secured and none was seen afted mid-July.

15. American Rough-legged Hawk

Buteo lagopus s. johannis.—One to two seen simultaneously on 11 days from 12 May to 12 June. Possibly very few birds were involved because all seen closely up to 7 June were in light phase, and single dark birds were seen on 9 and 12 June. One was seen on 28 Aug.

16. White-shafted Willow Ptarmigan

Lagopus lagopus leucopterus.—Does not occur as far sonth as Chesterfield Inlet in summer, but apparently a few were there in winter. Two wings were found, one in good enough condition to be saved as a record, and Constable Martin Donnan recalled seeing the occasional winter bird without black shafts.

17. Rock Ptarmigan

Lagopus mutus rupestris.—Apparently few if any migrants appeared before 1 May. They were more numerous by 10 May and the peak was 21 May when about 200 were seen flying north off-shore. All local females completely lacked the black eye bar in winter plumage. The females were changing by the time pairing occurred, but a mated pair were collected on 4 June (wt. 595 g. each) in the female of which there were still sufficient while feathers on the face to show that no bar had been present. The lack of a bar in the female seems to be common in many areas but is insufficiently emphasized in some books; the need for checking bill shape in the field should be stressed in popular works.

During the first few weeks, when the snow cover was almost complete, the birds ate leaves of *Ledum* and *Empetrum,* and in fact any living plant tissue, in addition to berries and willow buds. Both sexes were at first silent, but after mid May the males became very vocal and the females gave an occasional low *kuk.* The loud, dry *brrrk* of the male, when fully developed as a courtship note, lasts almost 2 seconds, and is usually given on the wing as the bird zooms up some 30 ft. into a stall. The males also displayed on the ground with tail fanned. The first trace of plumage change in the females was seen on 21 May. By 1 June some females had the crown, nape and back half changed, and by 20 June all were fully into summer plumage. The males showed no trace of change until 27 May, after which a few head and neck feathers were moulted and by 5 June the crowns and napes of most birds were mottled. No further change was noted, except for some birds becoming extremely soiled after the snow melted, until about 8 July when all males renewed the moult very abruptly. On 11 July they ranged from ⅓ to ⅔ changed and a few days later all seemed to be fully changed. This delayed change enhances the rôle of the cock as a decoy to draw intruders away from the sitting hen. He usually stands on a high rock about 50 yds. from the nest, and zooms, calls or flies in circles when an intruder appears. One cock and a parasitic jaeger flew in a circle for several minutes without it becoming clear which was the pursuer. The completion of the moult nearly coincides with the end of the incubation period.

Clutches and young broods seen numbered mostly 8 or 9; one clutch of 4 was seen, and Father Courtemanche stated that he had seen clutches of 10. On 2 Aug. a hen was seen with 16 chicks, presumably the result of two broods fusing. The incubation period was 20 days for one nest studied. The hen sat extremely close and was easily stroked on the nest. When she finally sidled off the nest she would droop her wings, raise her neck and crown feathers, hiss loudly and shuffle away. This decoy instinct could not contend with the unorthodox behaviour of a bird watcher. After checking the eggs we would leave at once, to minimize the disturbance. If the hen had started in the opposite direction she would turn and shuffle along behind us for some 30 yds., the whole party presenting a rather ridiculous appearance. About 3 days before the eggs hatched the hen's behaviour changed abruptly and she would fly furiously in one's face. The decoy behaviour seemed to be general, and the more violent reaction may also be as it was seen with one other bird.

Most clutches hatched between 14 and 20 July. The chicks were sometimes brooded in the nest and sometimes taken from it at once and the shells left in it. The hens gave no freezing signal to the young when disturbed, but hissed or clucked in apparent distress while the chicks ran wildly about peeping continually. The species seems to lack the sagacity of the willow ptarmigan and of grouse in general. Young chicks occasionally scattered into water but swam easily. Birds about a week old could fly a few feet. At about two weeks they could fly quite well, but were still cryptically coloured in flight, the first primaries to emerge being dusky. White primaries began to appear in front of and behind the dusky ones by the time the birds were about three weeks old. One was collected on 6 Aug. to show this stage.

The call of the female to the young in August was *ooer* or *ook,* apparently simply a gathering call. By 18 Aug. the largest young were approaching the size of the female; and the dusky primaries were a narrow wedge in the white wing, probably only about two being left. By 20 Aug. the peeping of the young had given way to a throatier call, and coveys over family size were seen.

18. Semipalmated Plover

Charadrius hiaticula semipalmatus. — First seen 2 June. Continuously present from 9 June. The *chooee* note typical of migrants was occasionally heard, especially at the start and end of the season, but it was usually replaced by a harsher note. The main call of the breeding season was a loud, repetitious *urryuk,* or later usually *yak,* generally ending in a long, chattered *yurrrk.* This call was given usually on the wing, but also often on the ground when it was generally accompanied by posturing. This behaviour had largely stopped by early August, but was noted in one of several migrant flocks from 30 Aug. to 1 Sept. This species nested commonly on open sand and gravel beaches. A male (wt. 49.5 g.) was collected from the nest following two injury-feigning displays on 28 June. The female, which had been less active in defence of the nest and had flown some distance away, then returned and feigned injury while the eggs were being packed. The display of both

birds often suggested female courtship posturing, as suggested by MacDonald (1947) for *C. h. hiaticula,* fully as much as a broken wing, but the explanation is complicated by the fact that it was done, perhaps predominantly, by the male. The 4 eggs weighed from 10.05 to 10.12 g. On 6 July, as the writer stood 3 ft. from a nest, one parent, after ineffectual injury feigning, approched him on the side away from the nest and scolded from less than 5 ft., so close that the palmations and dusky toe-joints were plainly visible. The manoeuvre was repeated with at least one other observer.

19. Golden Plover

Pluvialis dominica dominica.—Mr. Watts saw a small flock on 1 June, and the remains of one, evidently taken by a peregrine, were found next day. Single birds were seen 9 and 10 June. Three passed over on 14 Aug. and fresh tracks, perhaps of the same individuals, were found beside a pond. The disappointing lack of this and the next species is probably explained by their travelling off shore. See under migration.

20. Black-bellied Plover

Squatarola squatarola.—One to six birds seen or heard 8, 20, and 25 June and 10, 28 and 31 Aug.

21. Ruddy Turnstone

Arenaria interpres morinella.—Up to 12 seen frequently from 11 to 22 June, on 26 July and 5 Aug., and from 20 Aug. onward. The first juveniles appeared on 23 Aug. In spring, masses of kelp at high tide mark, largely red-brown with black shadows and with a scattering of fronds bleached white, were the chief feeding ground for this species, the shore still being ice-bound; against such a background the birds in breeding plumage were astonishingly hard to see. Fall birds fed largely on the tide flats, both by normal foraging and by turning stones. Rounded stones twice the diameter of the head were rolled with ease, but flat ones probably weighing no more presented difficulties because they tended to fall back in place. One was seen to take a long draught of salt water after feeding for 15 minutes.

22. Hudsonian Curlew

Numenius phaeopus hudsonicus.—Up to 27 seen often from 7 July to 10 Aug., especially from 18 to 29 July, generally in flocks. The only exception to the typical call was a soft *wheeee wheeee* barely audible as a flock passed 50 ft. overhead. One short-billed juvenile was seen on 24 Aug., and a distant flock of 10 unclassified birds on 2 Sept.

23. Knot

Calidris canutus rufus.—Single birds seen on 9 and 17 June. Near the beach, where the grey and red, rounded granite boulders lacked lichen covering, a bird in breeding plumage blended very well with its background. Suspected to migrate largely offshore.

24. Purple Sandpiper

Erolia maritima.—One seen on 16 and 17 June in the brownish breeding plumage in which it suggested a short-legged pectoral sandpiper with a few streaks running through the breast band; tarsi and base of bill dark brown, and toes dark purple-brown; silent and very tame. Two on 24 Aug., in changing plumage, gave one to four *whicks,* softer and less evenly spaced than the notes of the Hudsonian curlew.

25. Pectoral Sandpiper

Erolia melanotos.—Single birds seen on 9, 11, 15 and 17 June.

26. White-rumped Sandpiper

Erolia fuscicollis.—Seen regularly from 3 to 28 June, abundant most of the period. As they competed for food on the kelp piles, alone or with other species, their notes would run together into a fast titter. In an evident courtship display, seen on 15, 18, 19 and 20 June, a bird would stand with drooping, quivering wings and utter a vibrant insect-like, *whirrup-whirrup-whirrup,* etc. Fall migrants seen from 26 July and especially from 14 Aug. In late August the rusty-headed and -backed juvenal birds predominated; seen with the grayer adults they were still appreciably smaller.

27. Baird's Sandpiper

Erolia bairdii.—Present from 9 to 21 June, peak about 12 June. In addition to the familiar *creep* note given on the wing, birds on the beaches perpetually uttered a plaintive, somewhat squeaky *urvik,* sometimes doubled and faster with the accent transferred to the second syllable, *urvík-urvík* (the middle consonant between v and w). This call was occasionally given on the wing. Possibly this is the frog-like peep that Bent (1927) quotes Alfred M. Bailey as recording in Alaska. Since

Hickey (1943) does not record the track of this species, it may be noted that those of four spring adults gave middle toe 24-25.5 x 2.0-2.5 mm., toe-in 0-5°, and running stride to 125 mm. The inclusion of fall juveniles should give shorter toe lengths, but they could not be secured apart from white-rumps. Fall migrants were seen nearly daily from 6 Aug. onward, with a peak about 16 Aug.

28. Red-backed Sandpiper

Erolia alpina pacifica.—Seen first 2 June, continually from 8 June. Until 18 June many birds gave a long-drawn, rasping cry, roughly rendered as *chzree,* lasting about 3 seconds, as they glided down on set wings. It is thought that this note, unlike any recorded by Bent (1927) was given only by males. On 18 June one bird gave the *dear-dear-dear* recorded by Bent from Alaska. This species nested in small numbers. A female (wt. 59.9 g.) was collected from a nest on 28 June. The four eggs weighed 11.82 to 12.25 g. No male was ever seen in attendance on this nest, but on 4 July Mr. Chillcott found a nest with both birds present. Changing adults, apparently including migrants, were noted from 13 Aug. onward. A poorly defined migration peak occurred about 23 Aug., but the species was never abundant.

29. Semipalmated Sandpiper

Ereunetes pusillus. — Continuously present from 11 June and the principal breeding shore bird. A pair on 12 June gave a fast *chek-chek-chek-chek-chek* as they danced toward each other, but this performance was not seen again. The usual "song" was a pulsating *vurravurravurra* with 2 to 4 cycles/sec., given as the bird flew slowly with shallow, vibratory wing beats. This call lasted usually 5 to 30 sec., once 65 sec., without a break. The pitch and speed often changed abruptly. As the season progressed this call tended to become higher pitched, but was still dry and pulsating, as much like a whirling egg-beater as anything; far from the musical songs recorded by Bent (1927) from Alaska, but perhaps nearer to the twitter that he cites from Ungava. The call note was usually *chit* or *krit,* rather than the *cher* generally heard from migrants in the south.

An interesting courtship performance was watched on 19 June. A pair that had been flying about calling as just described came down on rocky tundra and engaged in a chase in which it is thought that the pursuer was the female. They buzzed or chittered as they ran, and both often had their tails cocked. The pursuer often had one or both wings briefly stretched vertically upward, and at least once raised its crown feathers. Suddenly the leader dropped into a small hole caused by a stone being displaced. It chittered softly, then got out and the other bird crouched in the cavity for some seconds. More chasing followed, during which, unfortunately, it is just possible that the identities of the two birds were confused, and finally the male made an unsuccessful attempt at copulation. The pair seemed to neglect the area during the next few days, but when it was revisited on 5 July the hole was skimpily lined with sedge and willow leaves and contained 4 eggs.

Two nests were found on tussocks in *Carex* marshes and one in a small *Carex* pocket high on a rocky hill. Two birds collected from the nest were both males (wt. 24.60 and 26.32 g.); although both nests had been watched for a few days only one bird was ever seen near each at a time. In the eggs of the bird taken on 8 July the embryos had developed to the extent that the wing bones were recognisable, and egg weights ranged from 6.37 to 6.68 g. The other nest contained 3 eggs when found on 30 June, but 4 when the bird and eggs were collected on 6 July; one egg (7.92 g.) was very slightly developed, but the other 3 (7.42, 7.44 and 7.73 g.) had embryos with eyes 3mm. diameter, suggesting that the male started to incubate before the female completed the clutch. This nest contained a few willow leaves and bits of grass or sedge that seemed to have been put in place, but those in the marsh were little more than depressions formed by the birds' bodies. One other nest was found on 17 July with 3 eggs, which hatched by 20 July, but possibly a broken egg had been removed. This nest was also in a dry pocket in rock; the parent bird, instead of running away from the nest and then flying, as was general early in incubation, stayed close, drooped wings and tail, ruffled out the body feathers and kept calling plaintively as the eggs were approached. Although this must be classed as injury feigning, the bird looked bedraggled and sick rather than injured. Most young hatched in the next few days and this manoeuvre became a common sight. If a chick was caught a parent bird would come within 3 ft., start this performance and shuffle away, keeping it up for 20 yds. or so. There was a suggestion of co-operation in care of the young, especially in one area of the settlement where at least four birds regularly guarded a group of young.

Once, when one of these chicks was caught, two injury-feigning birds simultaneously shuffled off in opposite directions and two others flew close about giving a repetitious *whik-whik-whik*. This cry and *krit* or *kreek* were regularly heard from birds with young. Two downy young, seemingly barely a day old when found on 19 July, had about ¼ in. growth of primaries on 24 July. On 2 Aug. the largest young seen could fly, but were still attended by adults. Small flocks of migrants on this date suggested that birds in some area inland or farther north had bred ahead of those at Chesterfield. By 7 Aug. most local adults had gone, but one was seen with young on 8 Aug. Migrants were seen steadily thereafter with a sharp peak on 21 Aug.

30. Sanderling

Crocethia alba.—Present in moderate numbers from 10 to 25 June, and 16 July onward. The fall peak was 14-22 Aug. As on many other northern beaches the quantity of *Fucus* and other algae was so great that a floating band 2 to 3 ft. wide often covered much of the water's edge when the tide was flowing. Lacking an unobstructed beach where they might follow the retreating waves, the sanderlings often ran about on these algal rafts, a leg occasionally slipping through. It is conceivable that the frequent occurrence of lame birds in this species is partly due to their being hit by a breaker while temporarily entangled.

31. Red Phalarope

Phalaropus fulicarius.—Seen from 11 June to late July, the spring peak being about 20 June when over 20 were seen. A few stayed and a male seen with three chicks barely dry and still in the nest, on 21 July, gave a breeding record.

32. Northern Phalarope

Lobipes lobatus.—Seen in moderate numbers from 11 June to 31 Aug. The female of a pair collected 12 July had two half-developed eggs in the oviduct. Weights were: male 34.65 g., female 38.27 g. Both birds had been feeding largely on crane-fly eggs and to a lesser extent on mosquito larvae and various aquatic insects. Bred in appreciable numbers, apparently rather late. From 31 July on several males behaved as though guarding young; they frequently used two notes *tirrik* and *urrvik* and occasionally gave a whistled *wheep*. Slightly grown young were seen 4 Aug. Males were definitely changing by 10 Aug.

33. Pomarine Jaeger

Stercorarius pomarinus. — Ten seen flying southwest on 5 June had perhaps been temporarily forced south of their normal summer range by the late spring.

34. Parasitic Jaeger

Stercorarius parasiticus. — Seen regularly from 17 June to 24 Aug. Nests found on 22 and 24 June, each with 2 eggs, were little but depressions formed by the birds' bodies; each was in a marsh, one in sedges and one on a slightly raised area of lichen heath. The prompt completion of the clutches indicated that the birds were mated before reaching their nesting ground. When the nests were approached the birds put on a striking display of dancing with lifted wings, trailing feet in the water and uttering high-pitched cries and wails. The more distant pair was collected (male 503.2 g., female 517.4 g., eggs 48.2 g. and 46.8 g.). The lighter phased bird flushed from the nest proved to be the male; it had been feeding on (? brown) lemming. The female had remnants of varying lemming feet in the stomach, but had recently been feeding on berries of *Arctostaphylos* and *Vaccinium*. Lemmings were very scarce. The closer nest, left for study, was unfortunately later found destroyed.

35. Long-tailed Jaeger

Stercorarius longicaudus.—One seen on 15 June and one on 16 Aug.

36. Iceland Gull

Larus leucopterus.—One, probably two, adults with herring gulls on 27 May. One first year bird on 7 June and one second year on 8 June.

37. Great Black-backed Gull

Larus marinus.—One adult seen on 15 Aug., probably a post-breeding wanderer.

38. Herring Gull

Larus argentatus smithsonianus.—First seen on 21 May; more numerous after 25 May. All birds closely seen up to 1 June were adults. In June, as the snow melted, gulls were attracted to the settlement by refuse exposed along the shore; several second and third year birds were then seen and one that was almost certainly first year. All age groups were definitely seen on Fairway I. on 1 July.

A nest on Fairway I. contained 3 eggs. Several nests were seen on small rocks well out in lakes. Groups of young in fresh juvenal plumage and still attended by adults appeared on the beaches in the last week of August. No birds seen clearly showed any sign of approach to *L. a. thayeri.*

39. Arctic Tern

Sterna paradisaea.—Abundant near the settlement from 19 June onward. At first the only calls were *kee-eek* and a rasping *kairrk,* but from the end of June a somewhat Kittiwake-like *kitchikéerk* was given repeatedly, especially when the birds were excited; the latter seems to be distinctive to this species. Repeated observations convinced the writer that the grey breast is the best field mark of the arctic tern; regardless of lighting conditions it always looks much darker than the tail and tail coverts. Nested abundantly on the islands off shore. On 1 July about 150 birds were seen on and about Fairway I., and about 10 nests were easily found in one area, some still with one egg. In two clutches taken the eggs weighed 17.6 to 18.3 g. There was often appreciable variation in egg pattern within a clutch, but the eggs in one nest were so dissimilar that it was hard to believe that they were laid by the same bird. A female collected 1 July weighed 109.1 g. and a male taken 6 July weighed 116.9 g. Several rocky islets in the larger fresh or brackish ponds on the mainland were used as nesting sites; one such islet harboured about 20 pairs. On 26 July more violent reactions to one's presence near these islets suggested that eggs had hatched. There was no opportunity to study the downy young. It was noted on 2 Aug. that adults busily bringing food to the nests would not offer it to the young while under observation; one circled off and returned at least four times with the same fish. The young began to fly about 19 Aug. The short wings and fast wing beat, short outer rectrices and lack of dusky trailing edge of the wing were more conspicuous marks than the narrow white forehead patch, which is not easily seen from the side. On 24 Aug. young hovered and dabbed with the bill, but did not seem to catch anything. Twice one settled on the water and turned up its bill to take food from a hovering adult, but it was not clear whether the signal for this action came from parent or from young. The young at this time gave a rather prolonged, soft, chittering note.

Small fish caught just off shore were the chief food item once the shore ice had gone, but prior to that many hunted along the small creeks, catching aquatic insects among other items. Small crustaceans were also seen to be taken at low tide. Once, from a canoe, about 300 birds were seen circling in a dense swarm. It was just possible, by standing in the canoe, to see that they were over a school of white whales (*Delphinapterus leucas*). This association is apparently familiar to the natives.

The adults were aggressive to intruders throughout the season, attacking jaegers, herring gulls, a gyrfalcon and man with equal vigour. The population definitely became reduced in late August. On 28 Aug. about 25 birds flying north off shore possibly indicated migration from farther south.

40. Brünnich's Murre

Uria lomvia.—Twenty or more were seen on 1 July between Fairway I. and the mainland. She-nee-tuk said he had occasionally seen them in summer, but he did not think they bred locally and had no name for them.

41. Black Guillemot

Cepphus grylle.—Often seen off shore in considerable numbers from 15 May. They are known to breed on several islands, and the eggs are said not to be laid until nearly mid July. Bad weather caused repeated postponement of a later trip to the islands and no detailed information could be gathered.

42. Short-eared Owl

Asio flammeus flammeus.—Single birds seen on 11 and 12 June.

43. Hoyt's Horned Lark

Eremophila alpestris hoyti.—First seen on 21 May, when at least 90 appeared after several hours of the first south to southwest wind for many days. The amount of yellow above the bill on birds present during the next week seemed to vary considerably; but the effect may have been due largely to difficult viewing conditions, for two collected on 28 May to show the range proved very similar in the hand; both were males (wts. 41.9 and 45.0 g.). One bird sang on 28 May and many on 30 May. Pairing seemed general by 17 June. During the next few days several birds sang for some minutes without a break at from 100 to 300 ft. Eggs in one nest hatched on 1 July, but on 8 July a bird was found almost flying, one day before the young left

this nest. Several young, with backs strongly speckled, were flying on 18 July. By 30 July most young had almost lost this speckling; and singing had almost stopped. Increased numbers from 12 to 17 Aug. indicated the onset of migration, but some were still present on 1 Sept. The species was second to the Lapland longspur as a breeding species, being evenly distributed both at and away from the settlement.

44. American Pipit

Anthus spinoletta rubescens.—Seen continuously, but sparingly, from 21 May. Bred in small numbers. On 11 June one zoomed and gave a prolonged squeaking note, presumably in courtship. A female (wt. 27.05 g.) was collected on 4 July from a nest with 6 eggs considerably developed. Most local birds seemed to leave about 5 Aug., but two with flying young, presumably late hatched, were seen on 8 Aug. A scattering of migrants seen thereafter.

45. Northern Shrike

Lanius excubitor.—What was evidently a juvenile of this species was seen intermittently about the settlement from 12 to 15 Aug. by several people, although not by the writer. It was clearly attracted by the perching space offered by various masts and wires. It was seen and described independently on 12 Aug. by Mr. Wm. Browney, Dr. W. E. P. Corbett and Dr. J. P. Moody, who all noted the general colour pattern, hooked bill and long tail. Next day Mr. Browney saw it at close range through a window and described the breast barring without prompting. Later, when confronted with the illustrations in Peterson's *Field Guide to the Birds,* he insisted that the colour was definitely that of the juvenile. Mr. Watts later saw it closely enough to confirm that it was a shrike.

She-nee-tuk and at least one other native saw it and declared it to be a strange bird. There had been a moderate northwest gale on 11 Aug. and a fresh west breeze on 12 Aug., but no south or southwest wind for several days.

46. Myrtle Warbler

Dendroica coronata.—A male flew into the Hudson's Bay Company's store on 11 June, following a few hours of moderate SSE to SSW breeze. Mr. Browney kept it until the writer had the chance to examine it; it was then released from a south door and swung round to continue northward. Father Courtemanche stated that he had seen the species at Eskimo Point; it is possible, therefore, that this bird was not quite as far out of its range as at first appeared.

47. Lapland Longspur

Calcarius lapponicus lapponicus.—The dominant breeding bird on the mainland. Two males and one female seen 19 May, 8 males and 2 females 21 May, and increasing numbers thereafter. Males were still somewhat predominant on 7 June. Early arrivals mainly frequented the wind-swept beach ridges, where there was little snow and the seeds of *Arerania peploides,* the sea-beach sandwort, provided abundant food. Single males sang briefly on the ground from 9 to 12 June. The weather on 13 and 14 June was overcast with high winds and temperatures scarcely above freezing, and no birds sang. On 15 June there were light winds, sunshine and temperature about 45°F. All males suddenly started singing. From then on the song was almost always given as the birds glided down on set wings from about 15 to 30 ft., the song stopping about as the bird landed. The glide was generally made up-wind. The song was clear and finch-like and seemed to undulate less than that of the snow bunting; but, although it could be told from the latter, the lack of definite melody in either made the distinction hard to define. Many birds were paired by 15 June. By 19 June pairing was general and there was some suggestion of boundary disputes. The first nest, with 3 eggs laid, was found on 22 June. Several nests were later found with 4 or 5 eggs; they were usually in an angle between two low rocks, or in some equally sheltered location, but one was in the middle of a clump of *Saxifraga tricuspidata* on an exposed beach ridge. In one nest the incubation time was determined as about 13 days. Singing was reduced by 7 July and had stopped by 14 July. Most eggs seemed to hatch by 15 July. Many adults were definitely moulting by late July. Most juveniles were nearly full grown on 29 July; some could fly on 2 Aug., but hid by preference when approached. By 7 Aug. the young looked much like the females; and by 20 Aug. they differed from both males and females mainly by their tameness, often not flying until one was within 5 ft. Flocks were first seen on 10 Aug. In late Aug. small flocks, alone or with snow buntings, were general.

48. Snow Bunting

Plectrophenax nivalis nivalis.—Many males, ranging from nearly typical winter to full breeding plumage, were about the settlement on 6 May and several were singing. The usual song was much like that of the purple finch, but a long, canary-like trill was occasionally given. Birds sang mainly from masts or roofs, but occasionally from rocks or even small snow hummocks. They are attracted to the houses by food and came readily to windows for crumbs, rolled oats, etc. Later the settlement provided copious caribou hair and other debris for nesting material. The breeding density was high in parts of the settlement. but was very low away from it. In one section of the settlement territories were reduced to about an acre, and were well defined and actively defended. Two males were first seen in a boundary dispute on 10 May. By 16 May most of these first males were fully into breeding plumage, but brown-marked birds on 19 May indicated a further migration wave of less advanced birds. Females were definitely seen on 9 June, but a few still in winter plumage might have escaped notice earlier. On 11 June a male sang to a female at the opposite end of a roof ridge and displayed with wings raised vertically. On 12 June more females were present and several pairs were seen. A female gathered nesting material on 17 June while the male watched and sang. Next day this and another male had a long boundary dispute while both females stayed well back in their territories. Most nests seemed to have 5 or 6 eggs; but few nesting data were obtained, since the native children found and robbed many nests although almost all were deep in rock clefts. One clutch was completed on 7 July, that of the bird seen building on 17 June. Singing was reduced by 7 July and stopped on 17 July. On 29 July some juveniles were about full grown and resembled dusky females; one was last seen demanding food on 10 Aug. Slight flocking was noted on 17 Aug. and thereafter. Some adults were definitely developing winter plumage by 23 Aug., and the change was rapid in the next week. It was nearly complete in advanced birds by 1 Sept. when most birds were in small flocks alone or with Lapland longspurs.

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NOTES AND OBSERVATIONS

Trumpeter Swans Breeding in the Cypress Hills of Alberta.—When in the Cypress Hills in July, 1948, the writer was surprised to hear of two swans which had been on Twin Lakes since early spring. Twin Lakes are two small marshy ponds at the source of Battle Creek about three miles from the Saskatchewan border.

On July 18, 1948, in company with Dr. J. E. Moore of this Department, I visited the lakes and saw both swans, but the birds swam into the tules on the far side before identification could be made. There was no evidence of nest or young then, but our time was limited and we did not search the area thoroughly.

In August, 1950, I was informed by Mr. R. Mackey, Chief Forest Ranger in the area, that the swans were once again on Twin Lakes and, moreover, had had four young there in 1949, three of which they raised.

In a recent letter from Mr. Mackey I have learned that the swans again bred at Twin Lakes in 1950, raising four young. Mr. Mackey also told of a report of a young swan being killed in the fall of 1950 east of the Hills in Saskatchewan at about the time the birds left Twin Lakes. Mr. W. Sturm, Assistant Forest Ranger, in a conversation recently, related seeing the old birds, accompanied by "three grey young about the size of geese", in September of last year (1950).

From the breeding records, there can be no doubt that the birds are Trumpeter Swans.

Recent reports from the area make no mention of swans. Neither Rand in "Birds of Southern Alberta", 1945, nor Godfrey in "Birds of the Cypress Hills and Flotten Lake Regions of Saskatchewan", 1948, record them, and it would be interesting to know to what area the young migrate. There are few bodies of water on the Alberta side of the Hills that appear to be suitable for swans. Most of the standing water is retained in beaver dams in heavily wooded country with the exception of Elkwater Lake which lies at the foot of the northern slope, and from which no swans have been reported. — *ROBERT LISTER, Department of Zoology, University of Alberta.*

Barrow's Golden-eye at Huntsville, Ontario. —On January 1, 1951, Aubrey May of Huntsville was on his way to join me in a bird-watching expedition, and when driving through The Locks, on the Muskoka River two miles south of the town, stopped to examine a duck which was in the quiet water above the dam. The bird was obviously a Golden-eye, but, fortunately in this case, the Common Golden-eye, *Bucephala clangula,* is not an everyday sight in this region, and May studied the bird before him with more than ordinary interest. To his amazement it appeared to answer the description of Barrow's Golden-eye, *Bucephala islandica.*

Following our meeting we returned at once to The Locks, and by remaining in a parked car on a high bank overlooking the river were able to make observations at leisure at a distance of approximately 25 yards. Both of us were using 8X binoculars.

There was no doubt that the duck was an adult male of Barrow's Golden-eye. Every identifying field mark of that species was clearly shown and carefully noted — purple-glossed head with crescent-shaped face mark, crown sloping back from abrupt forehead, extensive black on flanks, a conspicuous row of white spots on the scapulars, and, below these, two rectagular white patches. In addition to these physical details, the bird was noticeably less shy than the Common Golden-eye; when we approached on foot, it did not fly, but only swam across the river, less than 75 yards.

This duck remained at the same location throughout January 1 and 2, but was not seen thereafter. It was an industrious diver, and remained under water consistently for 15 seconds on each dive.

In view of the fact that this species could undoubtedly be easily overlooked, by observers outside what is now considered its normal range, the following remarks seem pertinent:

First, it is to be noted that May's unfamiliarity with the species *Bucephala* in general resulted in the identification—a warning of the dangers of familiarity. Second, to anyone accustomed to seeing the Common Golden-eye frequently, it is not the crescentic (or triangular) face mark which attracts attention to Barrow's, but rather the largely black body, and particularly the arrangement of white spots—on each side a row of small, evenly spaced spots above two larger rectangular ones. This conspicuous marking is not emphasized enough in most printed descriptions. The writer has looked at thousands of Golden-eyes with the hope of finding a Barrow's, but always concentrated on the head, where the specific distinctions, especially at a distance, are not outstanding.

I am indebted to James L. Baillie, of the Royal Ontario Museum of Zoology, for information that up to January 1, 1951, there were only three acceptable records of Barrow's Golden-eye in Ontario. On April 18, 1885, a male was shot at Toronto by Chas. Pickering and examined in the flesh by E. T. Seton but not preserved; a specimen in the Museum of Comparative Zoology at Cambridge was taken near Prescott on October 9, 1900; one specimen (sex ?) was seen at Weller's Bay, Northumberland County, on November 21, 1913, by John Townson.—*R. J. RUTTER, Huntsville, Ont.*

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THE WORK OF THE BRITISH TRUST FOR ORNITHOLOGY[1]

BRUCE CAMPBELL
British Trust for Ornithology, Oxford, England

ALTHOUGH one is part of a continental mass and the other a group of islands, ornithologically Canada and the British Isles have a good deal in common. Both are in the Holarctic region, with a seaboard on the same ocean, so that they share a great many species of birds. To both countries millions of birds migrate in spring (though more pass through the British Isles than remain to breed in them), and both (though Canada is much more affected in this respect) know what it is to have a depleted bird life in winter. Many of the habitats in each country are similar as regards the genera, if not the species, of plants forming them; the birds living in them eat the same types of food and enjoy the same varying daylengths; hence much of the general rhythm of the bird's life is identical in each country.

Above all, the observer factor is much the same in its outlook and composition, and this article attempts to describe the work of an organisation which links nearly 1,800 bird-watchers in the British Isles, from Shetland to Cornwall (which are about 800 miles apart), from Norfolk to County Mayo in Ireland.

The British Trust for Ornithology was founded in 1933 to maintain field-work already started at Oxford University. Distinguished signatures headed by that of Lord Grey, Chancellor of the university and former British Foreign Secretary, backed a letter appealing for support in the London "Times", but the Trust grew slowly and organically, moving towards its first objective, the formation of a permanent institute of field ornithological studies at Oxford. This was achieved, again in a very small way, not long before the 1939-45 war, which, after causing an initial suspension of activity and drop in membership, ended by giving both the Trust and the Edward Grey Institute, named in memory of Lord Grey, a tremendous fillip. The Trust became the body responsible for organising war-time enquiries into the food and habits of the wood-pigeon *Columba palumbus* and rook *Corvus frugilegus*, two species believed to be of considerable economic importance in Britain; both investigations had their headquarters in Oxford. Meanwhile a healthy desire for escape from the atmosphere of war, coupled with opportunities for observation in many unexpected ways and with the appearance of James Fisher's highly successful little book "Watching Birds", raised the Trust's membership to over a thousand.

In 1948 another big step was taken: the annual subscription was doubled and a full-time staff was appointed. Membership held, then increased, and is still growing today.

The Trust — as its name suggests — regards a subscription to its funds as an expression of support for its aims rather than as something for which an equivalent return in services must be given. Nevertheless its members do get a number of special opportunities. First of all, they may join in the current field investigations. The Trust was, in a sense, founded on the idea of the nation-wide co-operative enquiry, first formulated in 1928 by the magazine "British Birds", when it tried to count all British colonies of the heron *Ardea cinerea*. Among other early enquiries organized by the Trust which have considerably extended our knowledge of the species studied were those into the breeding biology of the swallow *Hirundo rustica*, into the food of the little owl *Athene noctua*, the report on which has helped to save this introduced and interesting bird from uninformed persecution, and into the decline and disappearance from many districts of the corncrake *Crex crex*, which was attributed to the increase in the mechanical cutting of hay over large parts of the British Isles. In 1949 the Trust reported on two standing investigations — the national banding scheme and the collection of nest record cards —

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and on eleven enquiries organized by individual members. Five of these dealt with the status and distribution, three with the populations, two with the migrations, and one with the behaviour of an individual species or of a group of British birds. The single behaviour study, into paper-tearing by birds (mainly titmice *Parus* spp.) attracted the widest attention reaching the headlines across the Atlantic and in Australia, and bringing in to the organiser some 2,500 replies from people quite outside normal ornithological circles. Canadian naturalists should be interested in two distributional studies, into the spread of the fulmar, *Fulmarus glacialis,* and into the percentage of bridled birds in colonies of the common guillemot or murre *Uria aalge.* In 1949, both these enquiries were repeats made in order to keep a running check on changes. The census of heronries continues annually in sample form under the direction of W. B. Alexander, author of "Birds of the Ocean", first Director of the Edward Grey Institute and now librarian of the impressive collection of ornithological literature at the Institute, named in his honour the Alexander Library.

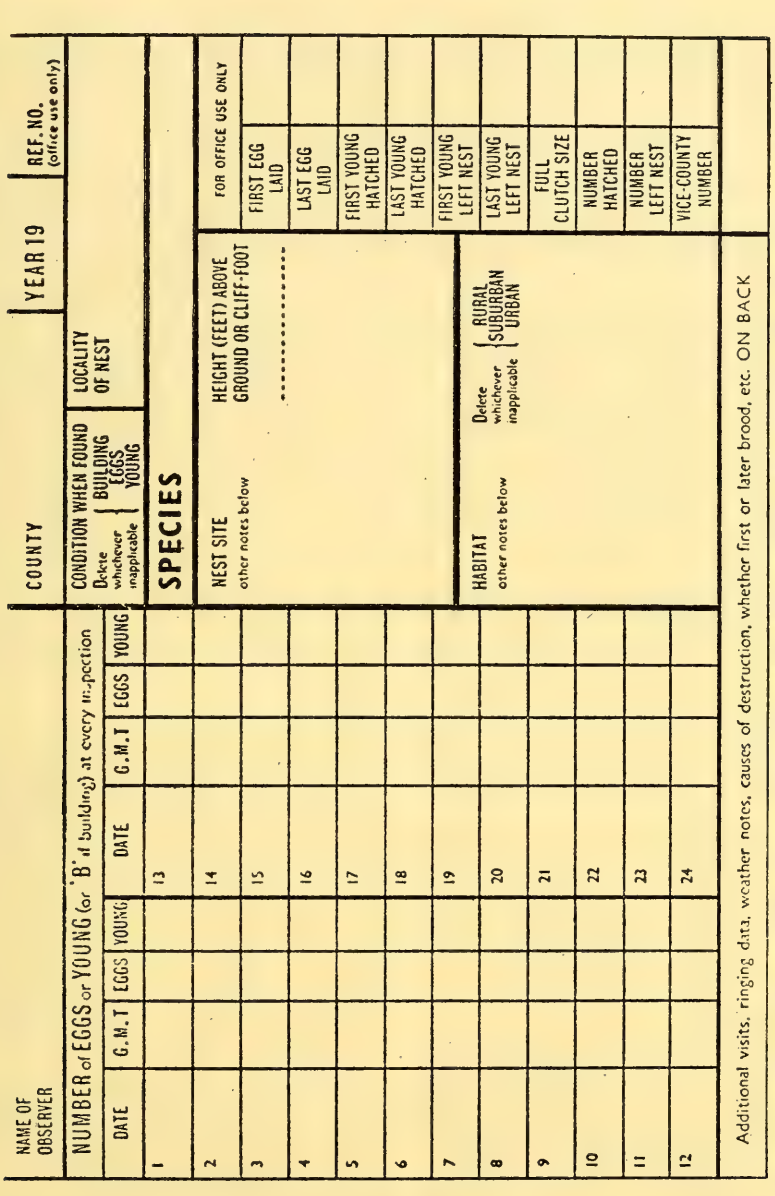
As well as helping in enquiries of a co-operative type, many members bring their individual field problems to the Edward Grey Institute or to the office of the Trust. One member has done a year's study of the ecology of a small freshwater marsh and wants to know if the ornithological aspect is worth pursuing; another has collected data on the behaviour of birds in fog (a truly British subject!) and wonders whether any members elsewhere are interested in extending his study. These are problems of research, not questions of identification, which it is the function of local natural history societies and museums to deal with. During my first year as Secretary I had correspondence with 200 members and 100 non-members — for the Trust tries to serve all ornithologists, whether they subscribe to its funds or not — on various technical matters.

Many members would probably regard use of the Alexander Library in the Edward Grey Institute as the chief benefit of Trust membership. The main reference collection must be consulted at Oxford, but for loan purposes there is a useful duplicate section, which includes runs of a number of American and foreign journals. Members only have to pay postage costs for this service.

The programme of meetings organised by the Trust has greatly expanded in the past two years, but meetings in the spring and summer are avoided as far as possible. For 1950-51, in addition to the annual general meeting, five scientific meetings have been fixed in London and other big centres in co-operation with various bodies, as well as several joint meetings of lesser importance. It is the policy of the Trust always to work in with similar organizations, whether national ones, like the British Ornithologists' Union (corresponding to the A.O.U.) and the Royal Society for the Protection of Birds (corresponding to the Audubon Society), or regional and local natural history and ornithological societies, which are strong and active in postwar Britain.

Last season's scientific meetings discussed methods of taking censuses, the study of migration, marine ornithology, the great tit, *Parus major,* (a symposium on the intensive study being carried out by the Edward Grey Institute on this species), and the recording of bird song and calls. In 1950-51 the subjects are the aggresive displays of birds and their study by means of dummies and mirrors; the starling *Sturnus vulgaris* (a species now being closely investigated by several British workers); international wildfowl research, and changes in the distribution of British birds. The variety of topics illustrates the desire of the Trust to interest its members, particularly the younger ones, in new problems and developing fields. In this connection, a special panel advises the British Broadcasting Corporation on the scientific use of the recorded material on bird voice now in its hands, while through the good offices of the Meteorological Office of the Air Ministry selected members are making voyages of observation on the Ocean Weather Ships off the west coasts of Britain.

Britain is not so small that all Trust members can get to the central meetings; the main contact of many with the Trust is through its publications. All members receive free a 48-page annual report and four periodic bulletins each year. The bulletins contain interim reports on investigations, notices and reports of meetings, notices of new books presented to the Library, requests for information on various subjects, and any other matters of current interest. They are not, however, scientific publications: full reports of field investigations are published in recognised journals, such as "British Birds" of the "Journal of Animal Ecology".



BRITISH TRUST FOR ORNITHOLOGY—NEST RECORD CARD

1. No card is to be completed for a nest in which no eggs were laid. But cards are welcomed for nests only visited once or twice, as well as for fuller records.
2. Under "Name of Observer," give the name of the B.T.O. MEMBER, not that of a helper. Corporate members should include the observer's name in brackets after that of the society: e.g. "Oxford Ornith. Soc. (J. Smith)."
3. (a) Fill in one line for each visit. If there is an interval of several days between finding the nest and the laying of the first egg, no record of intermediate visits is needed.
   (b) Between completion of the clutch and hatching of the first egg, and between completion of hatching and flight of the first young, there is no need to record more than one visit each day, unless some change has taken place.
   (c) When a visit is paid and the sitting bird is not disturbed, the symbol "S" should be used instead of the number of eggs or young. The symbols "♂" and "♀" (for male and female) should be added if the sex can be determined: thus "♀ S" means that the female was sitting.
   (d) No record of days without a visit need be made.
4. RECORD ONLY WHAT YOU HAVE OBSERVED: PLEASE MAKE NO GUESSES.
5. Completed cards to 'Nest Records,' Edward Grey Institute, 91 Banbury Rd. Oxford.

Fig. 1. Nest record card. The instructions, shown here at the bottom of the page, are printed on the back of the card with a blank space left for special notes.

But the Trust has recently embarked on a series of Field Guides, the aim of which is indicated by the first titles : "Trapping Methods for Bird Ringers" and "How to Choose and Use Field-Glasses". The next two will deal with nestboxes and with the recording of observations. It is hoped in these guides to assist bird watchers by assembling details and experience of techniques not usually the subject of papers in the journals.

I have already mentioned the national ringing (banding) scheme. This was started by "British Birds" forty years ago and handed over to the Trust in 1937. It is administered by a special committee. Nearly 60,000 birds were banded in 1949, a record total. A great deal of the banding (over one third of all adult birds banded in 1949) is now done at the eight Bird Observatories in Great Britain. These are recognised by the Trust — they must have a permanent trap and provide accommodation for visitors — whose Bird Observatories Committee links them for discussion of their scientific work. The observatories form a particularly vigorous growing point of ornithological field-work in Britain at present; more are being planned and it is hoped to see one in Ireland before long.

The Trust's other standing investigation, the nest records scheme, is much younger, being started in 1939 in an effort to gather accurate data on the breeding biology of the commoner British birds. The card used has twice been modified and is shown as Figure 1.

In comparatively few cases, members are able to enter full details of a nest as a result of regular visits; but even intermittent visits are useful as they give information on site and habitat, on breeding season, and probably on clutch size and brood-size as well. This is a rapidly expanding study; in 1949 the total of cards filed jumped by nearly a half to 7,500; and 9,000 of the new type, which came into use for the first time in 1950, had been distributed during the first six months of the year.

A great deal of interest has been taken in the nest record card, and it has been copied in several countries. Already sufficient data for such common species as the song-thrush, *Turdus ericetorum,* and blackbird, *Turdus merula,* have been accumulated for analyses to be made. The resulting papers have shown how clutch size and brood size may vary in different districts, in different years or during the breeding season, have confirmed the length of incubation and nestling periods, and have discussed hatching and fledging success and the causes of nest failure.

There is one other important service which the Trust offers its members : its scheme of regional representatives. These were appointed in 1948, mostly on a county basis in England and for larger units in Scotland, Wales and Ireland. The representatives are ornithologists of standing, nearly all of them closely connected with an important local society, so that they can act as a link between it and the Trust, can advise their members on local problems, and generally keep in touch with them. Sometimes they act as local organisers for the field enquiries. In the remoter parts of the British Isles, where there are few resident members, their chief job is to advise the bird-watching visitor how best to use his time.

The Trust is governed by a Council of eleven members, who serve for terms of not more than six years without a break. The Council meets about five or six times a year and its members travel an aggregate of thousands of miles to attend meetings. The Bird Ringing and Bird Observatories Committees have already been mentioned; the Research or Scientific Advisory Committee controls the actual field projects organized or aided by the Trust and is composed both of professional zoologists and of amateurs with life-long experience.

Such are the main activities of the British Trust for Ornithology. Now that the Edward Grey Institute is firmly established as part of the University of Oxford, the Trust may be expected to devote all its resources to assisting the individual member who spends his leisure studying birds, by offering him field projects of importance, by helping him in his personal investigations, and, above all, by encouraging him to adopt accurate methods of observation, so that his contributions are of value, not only to himself as a record of his own enjoyment, but to the science of ornithology at the same time.

A NEW ILLAENID TRILOBITE FROM THE MIDDLE ORDOVICIAN OF CENTRAL PENNSYLVANIA[1]

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THE PRESENT PAPER is based on a nearly complete fossil Illaenid trilobite collected by the writer in the summer of 1948.

LOCALITY

Near the town of Lemont and in the quarry near Oak Hall, Bellefonte Quadrangle, Pennsylvania are rock exposures occupying positions on opposite limbs of the Nittany Mountain syncline. Along a railroad cut directly south of Lemont, the lowermost Trenton, as defined by Kay (1944, I, fig. 2), the Nealmont formation occurs (see Table 1, this paper). At this place a single, nearly complete, individual of *Illaenus lemontensis* Tasch was collected from limestone rock containing many crinoidal stems. About ten to fifteen feet stratigraphically above this, near the end of

1) Received for publication September 11, 1950.

Table I.—Correlation of Black River and Trentonian of Central Pennsylvania and Northwestern New York and Eastern Ontario. (Modified after G. M. Kay's classification of 1948 to incorporate data in his 1929 and 1944 charts and tables).

	Central Pennsylvania			N. W. New York — E. Ontario		
Upper Trenton	Antes Coburn			Gloucester Collingwood Cobourg		
Middle Trenton	Salona (1* 2, 5)			Denmark Shoreham		
Lower Trenton	Nealmont	Rodman (4) Centre Hall (3) Oak Hall (3)		Kirkfield		
				Rockland	Napanee Selby	
	Curtin					
Hunterian	Benner	Stover (1) Snyder		Black River	Chaumont	Watertown Glenburnie Leray (3, 6)
					Lowville (5)	
Hatterian ‡	Hatter	Hostler (1)			Pamelia	
		Grazier Eyer				

* Particular occurrences of Illaenid and other trilobites referred to in the text are indicated by number as follows: (1) Illaenid sp. undet. (2) **Cryptolithus** tessalatus (3) Illaenus americanus (4) Illaenus lemontensis (5) Isotelus gigas (6) Illaenus latiaxiatus. (Other trilobite occurrences not relevant to the discussion are omitted.)

‡ Formations below the Hatterian are omitted.

the railroad cut, abundant cranidia of *Cryptolithus tessalatus* Green and some pygidia of *Isotelus gigas* (Dekay) were found.

STRATIGRAPHIC CONSIDERATIONS

The Nealmont formation consists of three members from oldest to youngest: Oak Hall, Centre Hall, Rodman. At other localities the basal Salona limestone is reported to overlie conformably the Rodman limestone member (part of the Black River Group of Butts and Moore, 1936) (Kay, II, 1944, p. 110).

While no Illaenid trilobite had been previously reported from the Rodman member or from the locality described above, *Illaenus americanus* has been reported from beds of the Centre Hall member and the Oak Hall member (Kay, II, table 8, p. 107) and undetermined Illaenid species from the Stover and Hostler members (Kay, *idem.*, I, table 3, p. 13; table 5, p. 19). It has been observed that *Cryptolithus tessalatus* Green first appears in the basal Salona and has never been found in beds older than the Shoreham (Kay, 1937, p. 302). Furthermore, the lower part of the Salona, at three different central Pennsylvania localities, has yielded either *Cryptolithus* or *Isotelus gigas* or an unidentified Illaenid species (Kay, II, 1944, table 10, p. 112).

The new Illaenid species occurs below the first appearance of *Cryptolithus tesselatus* in the Lemont exposure. It is not associated with either *Cryptolithus* or *Isotelus* at the place where it was found or where these species first occur. Accordingly, it is here assigned a probable stratigraphic position near the top of the Rodman limestone member of the Nealmont formation. It is probable that the species of *Cryptolithus* and *Isotelus* which were found belong to the basal Salona. A conformable contact between the Rodman and the Salona occurs near the end of the roadcut a few feet from where the railroad tracks cross the road leading to Oak Hall.

In view of the Illaenid trilobites reported from the Black River Group of Canada, the present find is of interest (Billings, 1859, 1865; Raymond, 1908; Okulitch, 1935; Wilson, 1947). Of these, the new species described below, is most closely related to *I. americanus* and *I. latiaxiatus* which first occur in the Leray beds of the Ottawa formation (Wilson, table I, p. 3). *I. americanus,* as already noted, occurs in the older Nealmont members in central Pennsylvania, while in the overlying Rodman beds, the *I. americanus* line appears to be continued by the population represented by the new Illaenid.

Although Illaenid trilobites have been used infrequently for correlation purposes, study of their occurrence may contribute to this end. Thus, consider the case of the "Leray beds" of the Ottawa district. These beds are no longer considered to belong to the upper part of the Black River Group but rather are equivalent to the Selby (Kay, 1937, pp. 251; 255, table 1, p. 253; Young, 1943, I, pp. 215-216). As noted above, *I. americanus* and *I. latiaxiatus* are found in the Leray beds of the Ottawa formation. Yet, a recent worker reported that *I. latiaxiatus* appeared to be limited to the lower Chaumont (Young, 1943, II, pp. 240; 235).

How does the Nealmont formation of Pennsylvania tie into this picture? Apparently correlation of the members of the Nealmont with the northern formations (Rockland, Kirkfield) has yet to be firmly established (Kay, 1944, II, p. 108). Nevertheless, a tentative correlation has been assayed based on the following evidence: the occurrence of two thick metabentonites in the upper twenty feet of the Oak Hall member; a fauna in the basal Centre Hall member which is similar to that at the top of the Rockland formation and the basal Kirkfield formation; a metabentonite in the Selby member of the Rockland; a metabentonite at the base of the Kirkfield. "It seems most probable that the known Kirkfield metabentonite is one of the two in the upper Oak Hall, preferably the upper." (Kay, 1944, II, *idem).*

If we follow the above correlation, the Selby member of the Rockland formation may then be equivalent to the upper Oak Hall member of the Nealmont. That would place the Leray beds of the Ottawa district at about the same horizon. It follows from this that *I. latiaxiatus* has a range beyond the Chaumont, at least to upper Oak Hall time. Since no specimens of *I. latiaxiatus* have been found in either the Oak Hall or Centre Hall members of the Nealmont, while *I. americanus* is present at several localities and occasionally is frequent or abundant, the conclusion reached above, that the new Illaenid species appears to continue the *I. americanus* line into Rodman time seems to conform to the present data.

Plate 1. Figs. 1-3 Illaenus lemontensis Tasch. n.sp.. Holotype. approximately natural size; (1) dorsal view of nearly complete fossil exoskeleton. (2) dorsal view of cranidium, (3) profile view.

SYSTEMATIC DESCRIPTION

Genus ILLAENUS Dalman

Illaenus lemontensis Tasch n. sp.

Cranidium, exfoliated, smooth, punctate, approximates semicircle in outline, low-angled convexity becomes more rounded anteriorly; dorsal furrows, 1 mm. less than one-half the length of the cranidium, deeply indented posteriorly, forming gently concave troughs which tend to converge and shallow anteriorly, coming to an end by briefly reversing direction and pointing away from the glabella; whole course of dorsal furrow approximates a sigmoid curve; width of convex glabella measured along its base from inner side of dorsal furrow, 18 mm., width where furrows end, 15 mm., no definition anteriorly, no glabellar furrows, no muscle scars (cf. Sinclair, 1947). Eyes broken off, position approximately on horizontal line drawn through anterior end of dorsal furrows; sutures apparently begin posterior to eye, curve inward, circle eye, and proceed obliquely in a broad curve to the anterior margin. Posterior lateral limbs broad, ending in blunt, straight, tapering genal spines which have been broken off. Probable width of cephalon from tips of spines circa 44 mm., without spines, actual width 38 mm. No occipital furrow, base of glabella and first thoracic segment being directly in contact.

Doublure, crushed when cranidium was compressed downward forming an angle of about 60 degrees with its original position, punctate, gently curved, 7 mm. long, 35 mm. wide, posterior marginal border consisting of two parallel shallow grooves on either side of a welt-like elevation.

Thorax with 10 segments; axial lobe defined by trough-like depressions continuation of dorsal furrows, approximately one-third the whole width, tapering from 18 mm. width near the base of the glabella to 14 mm. width near the juncture with the axial lobe of the pygidium; pleural lobes, 13 mm. wide, geniculate at one-half their width; uppermost deflected pleura thin out to stubby, needle-like elongations, inner face of each deflected pleura bears identical pattern of surface wrinkles; all pleura bear numerous punctae.

Pygidium, approximately same length as thorax, axial lobe broken off but convex stump, 10 mm. wide remains; convex in outline where axial lobe contiguous to last thoracic segment; rectangular in outline, sides sharply truncated almost at right angles to axis, continuing the geniculation of the pleural lobes on either side of the axial lobe; steeply rounded and gently arcuate posteriorly. Numerous punctae cover surface and a pattern of fine, slightly elevated anastomosing wrinkles emanate from vicinity of lower portion of axial lobe.

Relationships. — *I. lemontensis* shares in common with *I. americanus* Billings and *latiaxiatus* Raymond, the generic characteristic sigmoid curvature of the dorsal furrows, absence of glabellar furrows, a thorax with 10 segments, geniculation of the pleural lobes at one-half their width. It differs from them in several respects. It differs from both of these species in having a pygidium that is more distinctly rectangular at the sides due to pronounced truncation, while being convex anteriorly and arcuate at posterior margin. It is different from *I. americanus* in having a pygidium whose width is less than twice its length; and from *I. latiaxiatus* in the absence of four smooth oval areas on either side of the median line of the glabella; and in the absence of deep furrows defining the axial lobe of the pygidium.

While it may be further noted that *I. latiaxiatus* is also truncated on the sides of the pygidium and arcuate on the posterior margin, and also has a blunt spine, the convex outline of the posterior part of the pygidium of the new species is more confined to the central region and the proportions, as well as other characteristics of the cephalon, are different.

Types.—Holotype in author's private collection.

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COMMENTS ON THE RACES OF THE MYRTLE WARBLER[1]

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A SERIES of ten June-July adult Myrtle Warblers from the Lesser Slave Lake and Grimshaw areas of Alberta was recently examined by the writer and found to be best referable to *Dendroica coronata coronata* (Linnaeus). This prompted an examination of additional breeding material from Alberta, Saskatchewan, and Manitoba which disclosed that this also is closer to the nominate race.

Wing measurements of *D. c. hooveri* McGregor, based on Yukon and Alaska breeding specimens, and of *D. c. coronata* from eastern Canada have been published by Rand (1946). These measurements agree minutely with those of the writer. In a later elucidation of the respective ranges of the two races, Rand (1948) postulated the breeding range of *hooveri* to include Alberta and Saskatchewan, with Manitoba an area of intergradation. However, as has been determined both by correspondence with Dr. Rand and by reference to his original notes still in our files, the measurements he used for Prairie Province populations were made for Dr. Rand by an assistant. These particular measurements are at variance with those of the writer. Unfortunately they consistently exaggerate the wing measurements of Alberta, Saskatchewan, and Manitoba specimens to the extent that Rand was, naturally enough, misled by them into postulating that the breeding range of *hooveri* extends eastward to Manitoba.

Moreover, at the time the writer examined breeding material from Flotten Lake, Saskatchewan, he saw no reason to question these published measurements. It so happened that the Flotten Lake birds, because of their size, are apparently not distinguishable from *hooveri*, and thus the writer (Godfrey 1950) followed Rand (1948) in referring them to *hooveri*. In the light of the present study, however, it is apparent that the Flotten Lake birds are but large examples of the nominate race, are within its now known range of individual variation, and should be called *D. c. coronata*.

Some misunderstanding appears to exist also with regard to the colouration of adult males in breeding plumage. Oberholser (1938) and Burleigh (1944) state that the adult male of *hooveri* has a more solidly black breast than *coronata*. When this matter was mentioned to Dr. Oberholser some time ago he quickly assured the writer that this was a *lapsus* and that he had intended to write that *hooveri* has a *less* solidly black breast. With the latter the writer agrees. Oberholser (loc. cit.) also has pointed out that in *hooveri* the upper parts of winter birds and the young are less rufescent than in eastern populations. These colour differences are apparent in

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series of *hooveri* compared with *coronata* from Ontario and farther east, although there is some overlapping in individuals. Also autumn specimens taken in localities from Ontario eastward tend to be more heavily streaked dorsally. Colour differences apparently are not nearly so constant, however, as are those in size. Prairie Province *coronata* in colour tend somewhat toward *hooveri* but, in the writer's opinion, this difference is so inconstant that separation from the nominate race would be extremely impracticable. Size appears to be a more reliable criterion than colour in distinguishing between the two races, although colour is a useful supporting character.

Wing Measurements (in mm.) of Breeding Season Adults:

10 males from central Ontario, southern Quebec, New Brunswick, and Nova Scotia: 71.0-74.0 (average 72.2).

3 males from Manitoba (Bird, Herchmer, and Oxford House): 72.0-72.8 (72.3).

11 males from the east coast of James Bay: 70.1-77.5 (72.7).

8 males from Lake Mistassini, Quebec: 71.0-74.0 (72.7).

19 males from northern and northern central Alberta and central Saskatchewan: 70.6-75.0 (73.0).

13 males from Yukon and Alaska: 74.1-78.1, (75.8).

2 females from Manitoba (near The Pas and Herchmer): 66.9-67.1 (average, 67.0).

14 females from Ontario and Quebec: 66.5-71.2 (69.3).

10 females from northern and northern central Alberta and central Saskatchewan: 68.2-72.0 (70.1).

8 females from Yukon and Alaska: 70.6-73.5 (71.9).

Although the Alberta-Saskatchewan series averages slightly larger than series from more eastern localities, it is closer to the nominate race. Particularly significant are four May-taken males and a female from Wood Buffalo Park, northern Alberta. The males have wing lengths of 72.4, 72.2, 74.0, and 73.0 respectively, while the wing of the female measures 69.5 mm; thus they are clearly *coronata*. A series of nine adult males from Moar Bay, in the central part of coastal eastern James Bay (June 27 - July 11) is interesting for the individual variation in size it shows. Two have wing lengths of 76.5 (July 7) and 77.5 (July 11) respectively. The other seven are in size perfectly typical of *coronata* as also is another male from Paul Bay, farther north. From Mackenzie only two breeding adults were available, an early June male and female (wing length, 75.1 and 72.0 mm, respectively) from Mackenzie Delta. Their measurements suggest that *hooveri* is the breeding form of the Delta, but a larger series is necessary to determine this with complete certainty.

It seems, then, that although breeding birds of the Canadian Prairie Provinces, east of the Rockies, are somewhat intermediate in colour, and are slightly so in size, they are definitely nearer the nominate race. The breeding range of *D. c. hooveri* appears to include Alaska, Yukon, northern British Columbia, and probably northwestern Mackenzie (Mackenzie Delta). No useful breeding specimens of the Myrtle Warbler are available from the mountains of extreme western Alberta and the affinities of those populations remain to be determined.

As a migrant, *D. c. hooveri* is perhaps not uncommon in Alberta and Saskatchewan. Its presence in spring migration is attested by three specimens from Medicine Hat, Alberta, as well as by two from Regina and one from Indian Head, Saskatchewan. These were taken between April 23 and May 10. Todd (1947) records a specimen of *hooveri* taken at Last Mountain Lake, Saskatchewan, on May 23. Presumably this was a migrant.

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COURTSHIP BEHAVIOUR OF THE BOHEMIAN WAXWING[1]

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APPARENTLY very little is known of the courtship of the Bohemian Waxwing *(Bombycilla garrulus)*. Bent's Life History of North American Wagtails, Shrikes, Vireos and Their Allies (U.S. Bulletin 197, p. 64) remarks that the short statement by Mr. Swarth 1922, quoted below, is all that the author could find on the subject. The Handbook of British Birds (H. F. Witherby et al, 2nd Ed., 1943) gives no information on courtship in its account of the old world form, *Bombycilla g. garrulus*. The statement by Mr. Swarth just referred to reads, "On one occasion one of a pair of waxwings, presumably the male, was seen strutting about and exhibiting his beauties to his mate. Considering that the two sexes are alike in every respect, it seemed a rather superfluous performance, but at any rate one bird was hopping excitedly about from branch to branch, while the other sat still and looked on. The active performer kept the tail partly spread, wings drooping and crest raised and the whole body was held stiffly upright. After

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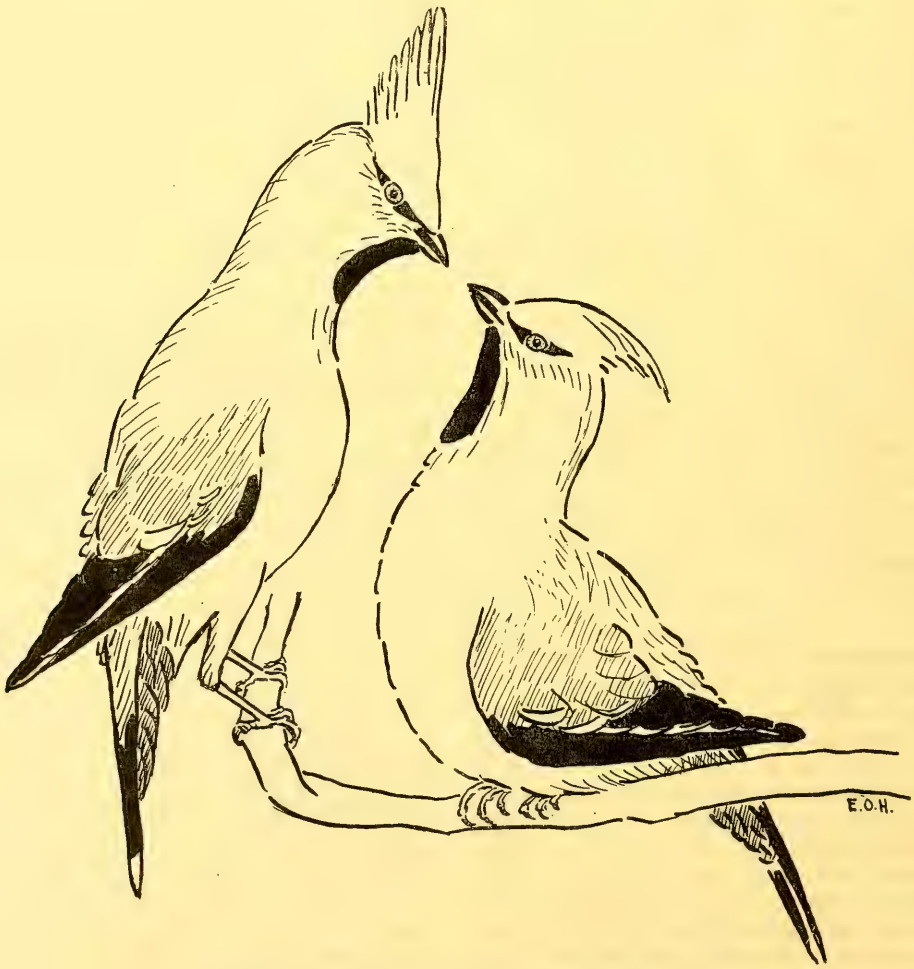

Bohemian Waxivings engaged in sham feeding.

several minutes, the other seemed to tire of the performance and flew away, followed at once by its mate."

In view of the scarcity of available information, the following observations of two phases of courtship, among different individuals, seen on the same day, seem worthy of publication. Both observations were made between 7:00 and 8:00 a.m. on April 7, 1949, near the south bank of the North Saskatchewan River on the outskirts of Edmonton. Observations were at a range of a few yards through 8 x 30 binoculars. The behaviour obviously indicating an earlier phase of sexual behaviour is described first, though, in fact, the observations were made in the reverse order.

Two Bohemian Waxwings were silently flitting about in a thorn bush. Starting from different parts of the bush, both birds settled on the same branch where, facing one another, one would go through the motions of feeding his opposite, from bill to bill. After a few moments, the two birds would separate only to meet again on the same branch to do more sham feeding. The bird which in one passage of this sham feeding was the "feeder" was often in the next the "receiver", i.e., the active and passive roles in sham feeding were switched back and forth between the two individuals. Although most of the billing actions observed were merely symbolical (sham) at least once a bud was passed from the beak of one bird to that of the other. During this sham feeding, both birds had their crests erect. The body plumage, particularly of the rump, was fluffed out. At the same time the tail was depressed and contracted so that the chestnut under-tail coverts became unusually prominent, even in a lateral view of the bird. The receiving bird lowered and retracted its head and was "fed" from above. The feeding bird therefore held its neck extended and the neck plumage was sleek, but that of the body was fluffed out as in the "receiving" bird. I have attempted to depict the postures involved in the accompanying sketch, based on a field sketch made at the time. Attention is drawn to the peculiar humped attitude of the body of the receiving bird.

After some minutes of bouts of sham feeding, interrupted by departures of each bird to another branch, they ceased this display and lapsed into actual feeding — each bird feeding itself.

About half an hour earlier I had seen what I take to be a more advanced stage of the same display. A party of eight waxwings was perched on a bare poplar. Two of the birds which were more or less on opposite sides of the tree would repeatedly fly to a common branch to go through the sham feeding motions described above, the bill and head motions being very reminiscent of the bill nibbling so frequently seen in budgerigars. The postures involved were as described above but in this case one bird consistently was the "feeder"; the other, which I presume to have been the female, "receiver". The "feeding" bird would repeatedly fly past the other on his way to or from the branch, hovering over and actually touching the rump of the other. I am sure these brief contacts were incipient copulatory attempts and I would therefore regard the (presumed) female's "food begging" posture as one which invites (releases) coitus from the male. It may be noted that the posture in which the females of some passerine birds, e.g., the English sparrow (*Passer domesticus*), solicit coitus is also like the food begging posture of the young.

The display of these waxwings was accompanied by soft squeaking calls by one or both members of the pair, quite unlike the normal "sree" calls which were given by the other members of the party which took no part in this display. The display ceased after a few minutes.

These observations suggest that sham feeding plays a prominent part in the display of this species and that the symbolical food begging posture of the female, perhaps accompanied by a special call, is a posture which solicits attempts at mating from the male. Actual feeding of berries or the ceremonial presentation of petals, as well as rubbing of the bill of one bird on that of another and begging by the female are, according to Bent's account, features of the courtship of the cedar waxwing (*Bombycilla cedrorum*). There is thus, as would be expected, much similarity in the displays of these two closely related species.

BIRDS OF THE ST. PIERRE AND MIQUELON ISLANDS[1]

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THE FRENCH ISLANDS of St. Pierre and Miquelon, lying just off the southern coast of Newfoundland, were visited from July 19 to 22, 1945, in connection with our study of the birds of Newfoundland. Since these islands are seldom visited by biologists we wish to list the birds which we recorded there.

Although these French islands are relatively close to the mainland of North America it is difficult to visit them by regular ships from either Canada or the United States. Most of their traffic is still with French and other Old World ports. We were working along the southern coast of Newfoundland in a motorboat of the Newfoundland Department of Natural Resources, and with the permission of that Department we left Grand Bank, Newfoundland, about noon of July 19 and travelled directly to St. Pierre, the capital and largest city of these islands. Mr. Angus Mullins and E. J. Bragg were in charge of the motorboat and the authors were the only passengers. The Newfoundland Government sent prior notification of our official visit, so we were met at the wharf by Mr. George Bartlett, son of the British Vice-consul. Mr. Bartlett kindly introduced us to His Excellency Monsieur Garrouste, Administrator of the Islands. He was quite interested in our scientific studies and granted permission to travel freely and to collect specimens. He even provided a pilot and a guide for the boat trip of July 20.

Several hours on the evening of July 19 were spent travelling in Bartlett's car across the island of St. Pierre on an excellent paved road. Three stops were made, mostly in scrub spruce and rocky hillside habitats. The next morning we left the harbor of St. Pierre in dense fog, passed Columbier Island, crossed "The Reach" between the islands of St. Pierre and Little Miquelon, and stopped at the small village of Langleade on the northern coast of the latter island. For several hours we worked up a wooded valley along a small stream and found a variety of small birds. Our next stop was at the southern end of "The Dunes", an elongated but narrow sandbar which connects Little Miquelon Island with Great Miquelon Island. A few shore and water birds were braving the strong wind of this exposed beach. We returned to the town of St. Pierre without further stops.

On July 21 we were fog-bound in St. Pierre harbor all day. In the morning we worked outside the town with the aid of Bartlett's car. Our boatmen were anxious to return to Newfoundland so we tried to brave the fog and very rough waters outside the harbor, but were forced to return to shelter. We walked through the town to an area of bogs, meadows, and scrubby hillsides, none of which seemed inhabitated by many birds. About 4: 30 on the morning of July 22 we left the harbor of St. Pierre still shrouded in fog, but relatively calm waters enabled us to proceed past the faintly seen Little Green and Green Islands. We continued to Grand Bank, Newfoundland, which we reached about 9 a.m.

The following birds were recorded during our sojourn of parts of four days in the St. Pierre and Miquelon Islands:

1. Gannet, *Morus bassanus* (Linnaeus). Ten observed near St. Pierre Island on the 19th and two seen off Little Miquelon Island.
2. European Cormorant, *Phalacrocorax carbo carbo* (Linnaeus). About 15 adults and subadults were sitting on high cliffs along the north coast of Little Miquelon Island. Local residents reported them nesting nearby.
3. Semipalmated Plover, *Charadrius hiaticula semipalmatus* Bonaparte. A male was taken on "The Dunes", Little Miquelon Island on the 20th.
4. Wilson's Snipe, *Capella gallinago delicata* (Ord). Three observed on Little Miquelon Island.
5. Spotted Sandpiper, *Actitis macularia* (Linnaeus). Two, on St. Pierre Island, gave indications of having young nearby, on the 19th. Five were seen on Little Miquelon Island, and six observed (one collected) on St. Pierre Island the 21st.
6. Sanderling, *Crocethia alba* (Pallas). Three found on the beach of "The Dunes", Little Miquelon Island.
7. Northern Phalarope, *Lobipes lobatus* (Linnaeus). A female was taken from a flock

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of three individuals in the water off Green Island on the 22nd.

8. Pomarine Jaeger, *Stercorarius pomarinus* (Temminck). One was observed several times, flying near "The Dunes", off Little Miquelon Island.

9. Great Black-backed Gull, *Larus marinus* Linnaeus. Seven observed off St. Pierre Island the 19th; about 20 off the coast of Little Miquelon Island; and several near St. Pierre harbor the 21st.

10. Herring Gull, *Larus argentatus smithsonianus* Coues. Observed commonly around the islands on each day.

11. Atlantic Kittiwake, *Rissa tridactyla tridactyla* (Linnaeus). About 40 seen off-shore and around rocks along the northern coast of Little Miquelon Island. Local reports indicate some may nest on the southern coast of this island.

12. Arctic Tern, *Sterna paradisaea* Pontoppidan. A number flying around Little Green Island on the 22nd indicated a nesting colony of about 150 pairs, but we were unable to land to investigate.

13. Dovekie, *Plautus alle alle* (Linnaeus). A non-breeding male was taken off Little Green Island on the 22nd.

14. Black Guillemot, *Cepphus grylle atlantis* Salomonsen. At least 50 were observed along the rocky northern coast of Little Miquelon Island.

15. Atlantic Puffin, *Fratercula arctica arctica* (Linnaeus). We took three near Columbier Island on the 20th, where many were nesting. Others were seen daily around St. Pierre and other islands.

16. Yellow-bellied Flycatcher, *Empidonax flaviventris* (Baird and Baird). About five were heard, and one was taken, on Little Miquelon Island on the 20th.

17. Northern Horned Lark, *Eremophila alpestris alpestris* (Linnaeus). One was found along the grassy shore at the edge of "The Dunes", Little Miquelon Island.

18. Newfoundland Black-capped Chickadee, *Parus atricapillus bartletti* (Aldrich and Nutt.). About eight were observed on Little Miquelon Island on the 20th, and one specimen proved to be this race.

19. Newfoundland Brown-capped Chickadee, *Parus hudsonicus rabbittsi* Burleigh and Peters. Fairly common on Little Miquelon Island.

20. Red-breasted Nuthatch, *Sitta canadensis* Linnaeus. An immature was taken on Little Miquelon Island on the 20th.

21. Newfoundland Winter Wren, *Troglodytes troglodytes aquilonaris* Burleigh and Peters. Fairly well distributed on both St. Pierre and Little Miquelon Islands.

22. Newfoundland Robin, *Turdus migratorius nigrideus* Aldrich and Nutt. Common on St. Pierre and Little Miquelon Islands each day. An immature was taken on St. Pierre Island on the 21st.

23. Northern Gray-cheeked Thrush, *Hylocichla minima minima* (Lafresnaye). Common on St. Pierre Island and very common on Little Miquelon Island where one was taken the 20th.

24. Eastern Ruby-crowned Kinglet, *Regulus calendula calendula* (Linnaeus). Four were seen on Little Miquelon Island.

25. Newfoundland Yellow Warbler, *Dendroica petechia amnicola* Batchelder. Common and well distributed in suitable habitats on both St. Pierre and Little Miquelon Islands. Two males were taken on St. Pierre Island, on the 19th and 20th.

26. Eastern Black-poll Warbler, *Dendroica striata striata* (Forster). Fairly common on both St. Pierre and Little Miquelon Islands each day. A male was taken on the former island on the 19th.

27. Newfoundland Water-thrush, *Seiurus noveboracensis uliginosus* Burleigh and Peters. Fairly common on both St. Pierre and Little Miquelon Islands. A male from St. Pierre the 19th proved to be this race.

28. Mourning Warbler, *Oporornis philadelphia* (Wilson). Common and well distributed on Little Miquelon Island.

29. House Sparrow, *Passer domesticus domesticus* (Linnaeus). A few were seen in the town of St. Pierre each day.

30. Newfoundland Pine Grosbeak, *Pinicola enucleator eschatosus* Oberholser. Two observed on Little Miquelon Island on the 20th, when we collected a male of this race.

31. Common Redpoll, *Acanthis flammea flammea* (Linnaeus). An immature was observed on Little Miquelon Island.

32. Labrador Savannah Sparrow, *Passerculus sandwichensis labradorius* Howe. Fairly common on both St. Pierre and Little Miquelon Islands each day.

33. White-throated Sparrow, *Zonotrichia albicollis* (Gmelin). Found commonly on Little Miquelon Island.

34. Eastern Fox Sparrow, *Passerella iliaca iliaca* (Merrem). Common to abundant on both St. Pierre and Little Miquelon Islands each day. Cooke (Bird-Banding, 13: 180, 1942) reported one taken at St. Pierre, April 10, 1937, which had been banded C160076 at Pomfret, Connecticut, November 11, 1932, by Mrs. K. B. Wetherbee.

35. Northern Swamp Sparrow, *Melospiza georgiana ericrypta* Oberholser. Common each day on both St. Pierre and Little Miquelon Islands. Two specimens taken on St. Pierre Island on the 21st were typical of this race.

A NEW NORTHWESTERN OLIVE-BACKED THRUSH[1]

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IN the ornithological literature of the latest decade considerable confusion is apparent with reference to the status of *Hylocichla ustulata almae* Oberholser (1898), the type locality of which is in the East Humboldt Mountains, Nevada. This name has recently been applied by authors to populations as far west as California, as far east as Newfoundland Labrador, and as far north as Yukon Territory! This race was admitted to the American Ornithologists' Union Check-list of North American Birds (19th Supplement) in 1944, at which time the Committee cited Oberholser (1938), Dickey and van Rossem (1938), and Wetmore (1940), as literature establishing its validity. A careful perusal of this literature, however, reveals little more definite information than that these authors were of the opinion that *almae* is valid. What material was examined as the basis for these opinions is not stated. Perhaps the key to the situation is contained in an earlier publication by van Rossem (1925), in which he expressed a belief that *almae* is valid. He made it clear, however, that this opinion was based on a comparison of California breeding specimens with material thought to be *swainsoni* from the eastern United States. Recently the writer (Godfrey and Wilk, 1948, pp. 18-20) pointed out, however, that birds inhabiting extreme southeastern Canada and northeastern United States differ from *swainsoni* in being of decidedly more rufescent colouration. These have since been described and named *H. u. clarescens* Burleigh and Peters (1948), type locality Glenwood, Newfoundland. Naturally, then, California birds *are* greyer than birds from the southeastern parts of the range of the species, the latter being racially separable from *swainsoni*. Had van Rossem compared his specimens with *swainsoni* from Saskatchewan, for example, it seems certain that he would never have recognized *almae*. Moreover, in as much as New Jersey was considered to be the type locality of *swainsoni* at the time Oberholser (1898) described *almae*, it seems probable and unfortunate that he compared specimens of the population he named *almae* with specimens from northeastern United States.

The writer has examined the type specimen of *almae* together with June-July specimens from the following localities presumed to be within the range of *almae*:

Montana (Crazy Mountains, 1; Emigrant Gulch, 1; Flathead Lake, 1; Johnson Lake, 1);

Colorado (Avalo, 2);

Idaho (Inkom, 1; Silver, 1; Bonneville Co., 2; Teton Co., 1; Bear Lake Co., 2; Valley Co., 1; Boise Co., 1);

as well as specimens from southern and central British Columbia. I regret that these are not separable from *swainsoni* (Saskatchewan to Quebec) and that *almae* must, in my opinion, be relegated to the synonymy of *swainsoni*[2]. As a matter of interest, the fact that these populations are not separable from each other undoubtedly accounts for the application of the name *almae* to eastern Canada populations by Braund and McCullagh (1940, p. 116), Peterson (1947, p. 267), and Burleigh and Peters (1948, p. 118). However, these authors should have used the older name *swainsoni* for these birds.

[1] Received for publication October 25, 1951.

[2] Dr. Harry C. Oberholser informs me (in litt.) that as a result of his recent investigations he, too, has concluded independently that *almae* is a synonym of *swainsoni*.

Recently the writer (Godfrey and Wilk, 1948) discussed geographical variation in this thrush, and commented on the grey colouration of specimens inhabiting Yukon and northern British Columbia. This character has been noted also by Rand (1946, p. 52) and by Bishop (1900, pp. 119-120). Still more recently the National Museum of Canada has received additional good series of breeding material from Yukon and the Lesser Slave Lake region of Alberta. A series of 37 breeding specimens, now available, is so uniformly different from birds in comparable plumage from other parts of North America, that it is obvious that the former represent a very well marked, heretofore undescribed subspecies. As all names, except *H. u. almae* Oberholser, appear either to refer to eastern populations or to be unavailable for other reasons, and since *almae* refers to a very different population which is not separable from *swainsoni,* there appears to be no name available for this new race. It may be called:

Hylocichla ustulata incana, subsp. nov.

Yukon Olive-backed Thrush

Type.—Adult male, No. 30229, National Museum of Canada collection; Lapie River, Canol Road mile 132, Yukon Territory; June 23, 1944; A. L. Rand.

Subspecific Characters.—Nuptial plumage superficially resembles most closely that of *H. u. swainsoni* (Tschudi) but the upper parts are uniformly decidedly greyer (less olivaceous); the buffy areas of head and breast average paler; the spotting of breast averages darker; and the edges of the remiges and their coverts are less buffy. In its grey colouration it is, of course, very different from both *H. u. ustulata* (Nuttall) and *H. u. clarescens* Burleigh and Peters. In juvenal plumage it differs from all other known races in having the central streaks of the feathers of nape and scapulars almost white instead of buffy and the other upper parts are of a more greyish olive-green. In autumn plumages it is separable by its greyer olive upper parts, in which no suggestion of brownish is present.

Known Range.—Eastern Alaska (Chitina River at Glacier), southern Yukon Territory, northern British Columbia, and north central Alberta east to Grimshaw and Joussard. Probably breeds also in interior Alaska and western Mackenzie.

Breeding Season Specimens Examined (37).—Alaska (Chitina River at Glacier, 6); Alberta (Grimshaw, 2; Joussard, 8; Peace River Landing, 1); British Columbia (Summit Lake: 12 miles north, 3); Yukon (Kathleen Lake region, 8; Kluane, 2; Lapie River at Canol Road, 6; Nisutlin River at Canol Road, 1).

Comments.—Undoubtedly the breeding range is more extensive than is now known, for the writer has examined little material from Alaska and none from Mackenzie. The Glacier, Alaska, birds examined were taken on May 31 (1), June 2 (2), 3 (1), and 5 (2), but despite the earliness of these dates they probably represent the breeding population as two females taken on the last date had a fully developed egg in the oviduct. These birds may perhaps incline slightly toward the nominate race but they are decidedly nearer *incana* which probably breeds widely in interior Alaska.

No actual topotypes of *swainsoni* from Carleton House, Saskatchewan, have been available for examination, but an adult from Churchill River (June 14, 1914), north of the type locality, as well as one from Flotten Lake (July 26, 1948) and another from Cypress Hills (June 12, 1948) all in Saskatchewan, are like birds from farther east in Canada (Manitoba to Quebec) and there would seem to be little doubt that the name *swainsoni* applies to the less greyish population. A series of five from Wood Buffalo Park, Alberta, two of which were taken on May 29, the others on June 2, 8, and 22, respectively, show some intermediacy but appear to be definitely nearer *swainsoni.* From farther west in north central Alberta, however, a series of ten June-July adults from Joussard (Lesser Slave Lake) and Grimshaw is very uniform and is definitely referable to *incana.* Southward intergradation with *swainsoni* semes to be quite rapid for four June-July adults from Lac la Nonne, while not quite typical, are definitely referable to *swanisoni* as also is a bird taken on May 24, 1926, at the same locality.

From northern British Columbia the writer has seen only three breeding specimens. These, perfectly typical of *incana,* are from Summit Lake on the Alaskan Highway. Birds examined from central (Hazelton) and southern (Rossland, Midway, Okanagan Valley, Deer Park, and Trail) British Columbia are *swainsoni* as well as are those from Jasper

and Banff in the Alberta part of the Mountains. This agrees with the findings of Oberholser (1898) who, apparently many years ago, so identified some of the material examined by the writer.

On the evidence of an examination of specimens of migrants, *swainsoni* is the commoner of the two races during migration in southern Alberta and Saskatchewan. However, migrant specimens referable to *incana* have been seen from Old Wives Creek, central southern Saskatchewan where one was taken on May 28, 1895; two from Cypress Lake, May 31 and June 2, 1921; four from Lac la Nonne, Alberta, two of which were collected on May 24, 1926, the others on September 2 and 17, 1926, respectively. A migrant from Elko, British Columbia (May 26) also seems referable to *incana*. Specimens used as a basis for published records of *almae* in other parts of the continent should be re-examined since many will probably prove to be examples of *incana*.

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LAND SNAILS OF THE CYPRESS HILLS AND THEIR SIGNIFICANCE [1]

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THE CYPRESS HILLS of southwestern Saskatchewan and adjacent Alberta make up a dissected plateau rising to elevations between four and five thousand feet above sea level. Completely surrounded by the plains, much of which is semi-arid, the hills present a striking biological contrast. Associated with coniferous forests suggestive of the foothills or the northern plains are floras and faunas very different from those of the lower areas nearby. The problems are: have we here a relic of the preglacial biota, and if so, how has it survived; if not of preglacial origin, what are the relationships of the assemblage, and how has it been able to traverse over 150 miles of now unsuitable habitat. Striking relationships have been found by the botanists and ornithologists, but their conclusions are open to the objection, probably not really valid, that seeds and spores can be blown, and birds can fly. A group that appears to be secure against dismissal on such grounds is that of the land snails. Terrestrial gastropods have no means of dissemination other than their own slow crawl. They are sensitive to environment, and are sufficiently diversified to indicate geographical relationships. With these thoughts in mind I have made, from time to time, small

[1] Received for publication February 27, 1951.

collections of land snails from different parts of the Cypress Hills. More recently I have had an opportunity to identify all of this material, and to reach certain conclusions regarding its relationships and origin. Detailed descriptions, with illustrations, have been prepared, and will be published. It is possible, however, that additional collections may be made in the near future, which, while they would not be likely to alter the general picture, would require further time for study. The present paper, therefore, is a report of progress, with the conclusions that appear justified from the results to date. I am indebted to Dr. F. A. Urquhart, Director of the Royal Ontario Museum of Zoology, for the loan of specimens in his collections. The remaining material is preserved in the National Museum of Canada. Dr. J. P. E. Morrison, U.S. National Museum, confirmed the identification of *Vitrina alaskana.*

The following species of land snails were collected by me from the western extremity of the Cypress Hills plateau, known as the Head of the Mountain. This is located in section 8, township 8, range 3, west of the 4th meridian, Alberta. The shells occurred in mould and under logs in light stands of pine. The elevation here is about 4700 feet.

Oreohelix strigosa stantoni Dall
Oreohelix subrudis subrudis (Pfeiffer)

A larger series was later collected in the vicinity of Cypress Hills Park, Saskatchewan, section 20, township 8, range 26, west of the 3rd meridian. Most of the specimens were found under logs in the pine forest, but the majority of the *Oreohelix* shells were taken in the open, following a heavy rain. The elevation here is approximately 4000 feet.

Oreohelix subrudis limitaris (Dawson)
Euconulus fulvus alaskensis (Pilsbry)
Zonitoides arboreus (Say)
Vitrina alaskana Dall
Discus cronkhitei anthonyi (Pilsbry)
Vertigo modesta (Say)

Of the combined list of eight species or subspecies, two are widely distributed in North America, one is characteristic of the eastern regions, one is restricted to the Cypress Hills, and four have their nearest relationships in the Rocky Mountain region.

It is considered unlikely that these mollusks could have survived close proximity to a continental glacier, even if the Cypress Hills plateau was not overrun by the ice. Moreover, in a relict fauna, there should be more elements special to the area, such as *Oreohelix strigosa stantoni.* It is believed that most, if not all, of the land snail fauna entered the Cypress Hills in early post-glacial time.

To explain the preponderant Rocky Mountain aspect of the fauna, the following hypothesis is proposed. The northeasterly withdrawal of the ice front opened a notch-like area between the Rocky Mountains and the Cypress Hills. Into this a flora and fauna spread from the southwest. Because of the climatic conditions, the forms represented were predominantly of alpine type. Further shrinkage of the ice permitted an approach towards the present climatic conditions. The plains became warmer and drier, and the alpine assemblage withdrew to the higher elevations of the Cypress Hills. Meanwhile the present woodlands belt of the more northerly plains became occupied by plants and animals from the southeast, as there was no longer an ice barrier to prevent their spreading from this centre. But to the southwest the development of semi-arid plains produced a barrier against both the introduction of the Rocky Mountain forms into the northern woodlands and the contamination of the Cypress Hills assemblage by woodlands, i.e., eastern, elements.

THE OCCURRENCE OF CYSTIDS IN THE ORDOVICIAN OF ONTARIO AND QUEBEC[1]

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WHILE ASSISTING in the preparation of a work on the ecology of fossil organisms, I have re-read almost all the papers in which "cystids" (i.e. Cystoidea, Carpoidea and Edrioasteroidea), have been described, seeking in them some information about the mode of occurrence of these fossils. The results have been very meagre, because in most cases the authors, while giving the stratigraphic position of their species, say nothing of the immediate lithological environment of the fossil, nor the immediately associated fauna, if any. This is information which no one but the collector can supply, for ordinarily even a careful collector does not keep separate those specimens which were found on the surface of a bed of limestone, those found within it, and those found in shale just above it. And ordinarily there is no felt need for such minute accuracy. Indeed, one may imagine the comments from editors were all our specific descriptions to be lengthened by paragraphs with such data.

Since I have spent much time collecting in beds which contain cystids, and have been fortunate in finding them, I wish to record what I can of the way in which they have occurred. This is an attempt in which accuracy is not possible. I think my recollection is clear, and I have notes to help my memory on some points, but unless one is conscious of a problem in the field, one is very apt to overlook evidence. Still, I can put down what I remember. The positive statements are apt to be right, the negative ones should be looked on with some suspicion.

I. UPPER CHAZY AT MONTREAL

In some parts of the Chazy on Ile Jésus, north of Montreal, *Malocystites* and *Canadocystis* are found in rather large numbers. Here they occur in a bryozoan coquina which seems to have accumulated on the flanks of bioherms, with no admixture of clastic materials. In places these beds form thick masses of coarse, strongly cross-bedded, calcarenites, with no recognizable fossils. These calcarenites are often made up entirely of comminuted fragments of echinoderms, and on their surfaces the characteristic deltoids of *Blastoidocrinus* are abundant, but seldom are recognizable specimens preserved. Most of the good specimens come from rather thin, patchy beds which are predominantly bryozoans, with so little cement that on weathering they break down rapidly to a heap of isolated fossils. Specimens of *Malocystites,* especially the larger forms, are also common in less pure limestones, but in these beds they tend to be so worn that one seldom collects them. This wear seems to have preceded burial. It is notable that in the coquinites the specimens invariably lack the stem, the brachioles, and often even the plates of the recumbent arms. This is not due to abrasion on the bottom, for the surficial granulation of the plates is frequently preserved in beautiful perfection. If these cystids grew where they are found, why should we not find some specimens with the stem and brachioles preserved? Hudson has suggested that these animals lay on the ocean floor, the eccentric shape of the theca being thought sufficient to ensure that the brachioliferous surface would be directed upward, the animal possibly using its brachioles to right itself if rolled over by waves. Were this the case, one would expect more evidence of wear of the lower thecal plates, and more encrustation by bryozoans. The latter were extremely abundant in these seas and most of my specimens of *Conularina triangulata* and *Palaeocystites* were preserved because of their protection by bryozoans which grew around them. I prefer Bather's suggestion. These cystids may have lived, as Bather suggested *Echinosphaera* did (1928, p. lxxviii), like captive balloons, floating well above the bottom, swaying at the end of a long delicate stem, taking their food from waters so constantly agitated by waves that there was as much microscopic food in the surf as on the bottom. Then with death the theca would eventually be torn from its stem and come to rest with the bryozoan fragments on the bottom. If the waves were sufficiently strong to grind up this bottom material, our calcarenite would result and the specimens be lost as such, but here and there in some quiet, protected spot the re-

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mains could rest until covered with a later influx of comminuted lime-sand.

There are few associated fossils in the beds which contain large numbers of the cystids. *Rhynchocamera* and the broken bryozoans are the only usual ones. In other, more fossiliferous beds in the Chazy, the cystids are present only as random rare members of the fauna.

II. UPPER TRENTON AT MONTREAL

The Tetreauville formation at Montreal (Clark 1945, p. 29) consists of a natural cement-rock, occurring in very fine-grained, thick beds, with thin shaly seams at rather wide intervals. In these beds *Cheirocrinus* occurs in local abundance. Although some of the shaly seams in the Tetreauville are quite fossiliferous, the cystids seem to be found alone in most cases on the surface of the limestone, rather than in the shales. Surfaces will be found with scores of specimens of *Cheirocrinus,* and no other fossils except *Serpulites* and an occasional *Conularia.* The *Cheirocrinus* are usually all of one size; faunules being known of thecal length from ½ to almost 2 inches. Whether this variation in size is taxonomically important is being studied. It may, of course, reflect similar environmental conditions. But it may be noted that in any one bed the size of the specimens is uniform.

This isolated occurrence of *Cheirocrinus* is not invariable. At one locality, in the quarry near the Chapelle de la Réparation at the east end of Montreal Island, where the beds are more rubbly than elsewhere, *Cheirocrinus* occurs in association with a fair number of *Ectenocrinus* and other fossils. Collecting here was from well weathered beds, and I have no notes on the precise occurrence of the free specimens which were picked up. It may be that the crinoids came from a few inches above or below the cystids, but my recollection is that they were together.

Cheirocrinus begins in the Montreal district low in the Trenton, and continues into the Terrebonne formation at the top of limestone sequence, but only in the Tetreauville have I found it common. In the other beds it occurs sporadically, as a very minor member of the fauna, usually dismembered.

What conditions can we postulate to explain the occurrence of abundant individuals so well preserved that the delicate brachioles are often in position, and the weak distal portion of the stem is commonly preserved? I have never seen in the beds with these large associations of individuals anything that could be an attachment base. The disposition of the brachioles around the periphery of an essentially flat oral surface make it necessary to imagine the animal as living erect. Can the rarely-seen distal stem have been a radix in function, pushing down into the soft mud to allow the animal to keep the theca erect, movement being possible in the rapidly-enlarging proximal stem, with its large lumen? Certainly the bottom was a soft mud, and the water quiet, at least when the animals died.

Cheirocrinus has a wide distribution (I have specimens from the Prosser in Minnesota, the Rogers Gap in Kentucky, and it has been reported from the Bromide of Oklahoma and elsewhere) but so far as I know it is usually rare. Throughout the upper part of the Cobourg in Ontario, plates of the genus are very abundant in places, but whole specimens extremely rare. I have only two, from the Collingwood district, and they lack the brachioles and the distal stem. They occur with an abundant fauna, and the mode of occurrence is very different from that seen at Montreal.

III. LOWER TRENTON AT PONT ROUGE

At Pont Rouge, Co. Portneuf, Quebec, one may see limestones of early Trenton age, which were laid down some fifteen feet above the pre-Cambrian basement. Several features point to very shallow and quite highly disturbed water (see Sinclair 1945). On one bedding plane specimens of *Amecystis* and *Pleurocystites* occur with some frequency, although they are by no means a dominant part of the fauna. The sea-floor at the time seems to have been a rather firm lime-mud, with broken shells of cephalopods and other animals half buried and being gradually broken apart by the waves. One such endoceroid lay on the bottom, the broken edges of the septa protruding up into the water, the camerae and siphuncle being filled in with drifting mud. In it are now found a dozen cystids. Were they feeding there? Or did the cephalopod shell afford them a firm footing in the soft muds? There is some suggestion that the latter was the case, for at least one echinoderm base is attached to the mud-filling of the siphuncle.

So far as we know these pleurocystids were not attached by any such disk, but were to some extent motile. The association is noted, without an attempt at detailed explanation. The preservation of the cystids is too poor to permit detailed study, and indeed it is impossible to say if some of them are this genus or that.

The associated fauna is large, and a variety of cystids is found in the same bed, although they are not all determinable.

IV. LOWER TRENTON AT KIRKFIELD

At Kirkfield, Ontario, the lower Trenton consists of thick beds of limestones with thin shaly seams, in which most of the echinoderms are found. I have found so few cystids here that I cannot offer any useful notes on their occurrence. One exception may be made, for *Edrioaster laevis* does occur in a sufficiently peculiar manner to make a note worth while. This species seems to be confined to one shale parting in the sequence. (It may occur elsewhere, but I have not found it, and the local quarrymen tell me that it is confined to the one bed.) Here it occurs on the surface of a heavy bed, covered and surrounded by black shale which can be readily removed. Its removal shows that the surface of the limestone itself is highly irregular, on a small scale. There are channels and pits in its surface, and the firm attachment of the *Edrioaster* as well as as the common occurrence of sessile tubes of *Cornulites* indicates that this surface was firm while the edrioasterids lived there, before the new mud came in to bury them. It may not be true for all the echinoderm-bearing beds at Kirkfield, but this one at least indicates shallow water, with a sufficient dearth of clastic material to allow induration and wear of one surface before a new influx of sediment.

Few other fossils occur on this bed. The *Cornulites* has been mentioned. I have found some foliate bryozoans rarely, and a new genus of agelacrinitids, which will be described elsewhere. But other fossils are lacking, in my experience. These statements about the lack of associated fossils should not be taken too seriously. They reflect my recollection, but I did not have this problem in mind at the time, and it may be that I do not recall fossils which at the time were present but unnoticed. While collecting in a bed with two-inch *Edrioaster's* it is easy to overlook *Dalmanella's.*

V. MIDDLE TRENTON AT PETERBOROUGH

Four miles north of Peterborough, Ontario, in a small quarry in the Upper Sherman Fall, echinoderms are common. The beds as a whole are very fossiliferous, and random specimens of *Pleurocystites* and agelacrinitids are found here and there. There is evidence, in frequent contemporaneous brecciation, ripple-marking, etc., that the water was shallow, although the amount of argillaceous material is very small and the beds are essentially a coquinite with a good deal of finely divided lime mud embedding the larger shells.

One particular bed is exposed on a narrow shelf about seven feet above the floor of the quarry. In the fine lime mud are embedded penecontemporary pebbles, flattened on top and with rather well rounded edges, ranging in size from an inch or so to over a foot in diameter. The bed itself is not very fossiliferous, but the pebbles seem to have been the only solid parts of the sea-floor, and they have been plastered with crinoid bases, bryozoans, and particularly by hundreds of agelacrinitids. These specimens are now being studied in detail to see if they afford any information about the preference of these animals in terms of orientation, slope, etc. The studies will be reported later if they are fruitful.

Although several species of agelacrinitids occur in the twenty feet or so of beds exposed in this quarry, all those seen on the pebbles seem to be the same. This accords with the picture seen in the Cincinnatian, where it is the rule to find monotonous groups of these animals when they are found at all.

VI. MIDDLE TRENTON AT OTTAWA

The cystid beds at Ottawa are not easy to characterize. They are thin-bedded, with thin shaly partings, and the detailed lithology of the limestone bands is highly variable. Some thin beds are almost calcilutite, others are dirtier, and some, although these tend to be thicker, are even a sugary calcarenite. Throughout this sequence of beds, for some tens of feet, cystids occur in considerable numbers, without any detailed correlation with lithology that I can recall. Although the cystids occur throughout, associated with a large and varied fauna, the occurrence of individual species tends to be spotty. I have found small nests of a dozen or so species

of *Hybocrinus*, and less frequently groups of *Glyptocystites*. The late Mr. James E. Narraway told me of finding in one spot, in a shale parting, fifty well-preserved *Glyptocystites multipora*. Walter R. Billings (1881, p. 34) mentions finding a suite of specimens of *Pleurocystites filitextus*. Years ago I saw in the collection of T. W. E. Sowter a slab purporting to be part of this suite collected by Billings, and it had on it at least fifteen well-preserved thecae. They were in a flaky black shale, strongly tinged with red, a type of lithology frequently found in the cystid beds at the Chaudière.

I have really nothing conclusive to say about these beds, but mention them since they are *the* cystid beds. I can record that I have collected *Comarocystites* and *Amygdalocystites* from sugary beds, and the other cystids from the shaly partings between the limestone layers.

Since most of those who know it are now gone, it may be well to put on record the exact locality of the types of *Isorophus inconditus* (Raymond). After assiduous collecting which yielded only rare single specimens of the species, I complained to Mr. Narraway about the hardness of fate, and the luck of the old-time collectors. He then told me exactly where these agelacrinitids had been found "in the old days." I went there, and the fossils were still there. The species occurs on the surface of a bed of limestone about thirteen feet above the water level at Nepean Point. When I was there the layer had been mined so thoroughly back into the cliff that I could only pry out small pieces, but they were covered with the agelacrinitid, and hinted at the richness of the locality when the bed was exposed for some distance from Nepean Point down to the old Queen's wharf. As with most of the agelacrinitid-bearing beds in the Trenton this shows evidence of partial consolidation before the attachment of the animal. There is much small-scale channelling and roughening of the surface, and a pocking possibly due to boring or sedentary organisms. No other fossils were found in immediate association with the *Isorophus*.

This note is written from recollection and notes of collecting which is now old. These beds, especially those at the Chaudière, are essentially in the condition in which Elkanah Billings saw them, one hundred years ago, and afford an opportunity to a local collector to see if any pattern can be found in the occurrence of the cystids which might give a clue to their habits.

VII

I have noted here some of the localities at which I have found cystids in such numbers as to make them remarkable. But cystids are common throughout the limestones of the Middle Ordovician. In places in the Black River, e.g. the small quarry on the Base Line road just west of City View, near Ottawa, isolated plates of cystids (in this case amygdalocystids) are so abundant that they are a major part of the fauna. In the Rockland echinoderm fragments, mainly stem ossicles, are common, but no specimens have been found which permit identification, and so no echinoderms appear in faunal lists. Presumably some of these fragments are of cystids. It is obvious that our knowledge of the actual distribution of these animals is greatly controlled by accidents of preservation, perhaps to such an extent that we can never generalize about the subject at all. Certainly the data I have offered allow no general statements. Perhaps, as we gradually add individual records of the mode of occurrence of faunules, we may someday be able to achieve the synthesis which is now impossible.

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VASCULAR FLORA OF THE MELVILLE PENINSULA, FRANKLIN DISTRICT, N. W. T.[1,2]

J. A. CALDER

SINCE THE PUBLICATION of Polunin's Botany of the Canadian Eastern Arctic[3] in 1940, the writer has had access to three important collections of vascular plants made on the Melville Peninsula. Two of these have already been reported upon and it is the object of this paper to assemble these recent records and to bring up to date our knowledge of the flora of this relatively little known area.

During the summer of 1948, W. J. Cody[4] spent four days in the latter part of July at Ross Bay off Lyon Inlet (66°50'N 85°00'W) and collected 115 numbers of higher plants. In the same year B. J. Woodruff[5] made a smaller collection of 46 vascular plants on the west coast of the Peninsula at approximately 68°18'N 85°25'W. In 1950 P. F. Bruggemann and J. E. H. Martin collected a fine series of specimens in the Repulse Bay region. This series has added considerably to our knowledge of the flora of the region. The majority of the 173 numbers collected by Bruggemann came from the vicinity of the Hudson Bay Post, but others came from the vicinity of the Eskimo camp sites at Ikaktalik (66°33'N 85°37'W) and Avatakpatsiak (66° 35'N 85°23'W) on Havilland Bay at the northeastern extremity of Repulse Bay. In addition to the records provided by these three collections, the Rev. M. G. Duman[6] has reported on the Carices collected by Father A. Dutilly and himself along the east coast of Melville Peninsula during the summer of 1938. The collections of W. J. Cody in 1948 and P. F. Bruggemann in 1950 were made in the course of biological studies conducted cooperatively by the Division of Botany and Plant Pathology and the Division of Entomology of the Canada Department of Agriculture, and the Defence Research Board of the Canada Department of National Defence.

1) Contribution No. 1093. Division of Botany and Plant Pathology, Science Service, Department of Agriculture, Ottawa, Canada.
2) Received for publication, April 2, 1951.
3) Polunin, N. Botany of the Canadian Eastern Arctic. Part I; Canada, Department of Mines and Resources, National Museum Bulletin, No. 92. 1940.
4) Cody W. J. Plant collections at Ross Bay, Melville Peninsula, N.W.T. in press.
5) Cody, W. J. Plants collected by B. John Woodruff on the west coast of Melville Peninsula, Franklin District, N.W.T., Canada. Can. Field-Nat. 64 (2): 90-92 1950.
6) Duman, M. G. The genus Carex in Eastern Arctic Canada. The Catholic University of America. Biol. Ser. 36. 1941.

Polunin has recorded 126 species from the Melville Peninsula; ten of these species were of doubtful occurrence. In the list that follows two of these doubtful records are substantiated, one species is reported as new to the Canadian Eastern Arctic, and the known flora has been increased by 34 species (indicated by an asterisk), representing an overall increase of approximately 20%. A number of these records have already been reported, however, those of Cody from Ross Bay, and those of Bruggemann from Repulse Bay, representing 18 species, are recorded here for the first time. Only those specimens that represent new records or are of note worthy significance are cited. In cases where no specimens have been seen, reference is made to the publications of either Polunin or Duman.

PTERIDOPHYTA

Equisetaceae

EQUISETUM ARVENSE L.—Polunin, page 34.

E. VARIEGATUM Schleicher

Lycopodiaceae

LYCOPODIUM SELAGO L. forma APPRESSUM (Desvaux) Gelert

Polypodiaceae

*CYSTOPTERIS FRAGILIS (L.) Bernh.—open, west-facing, rock ledge, Avatakpatsiak, Havilland Bay, *Bruggemann 132;* open rock ledges and crevices near Nauja Inlet, Repulse Bay, *Bruggemann 31;* shallow soil among igneous boulders, Ross Bay, *Cody 1396, 1512.*

DRYOPTERIS FRAGRANS (L.) Schott

*WOODSIA ALPINA (Bolton) S. F. Gray—crevice of south-facing, rocky ledge, Repulse Bay, *Bruggemann 28;* rock ledges on ridge southwest of Nauja Lake, Repulse Bay, *Bruggemann 38.*

W. GLABELLA Br.—recorded only from Repulse Bay. Noted by Bruggemann as common everywhere on the dry heath, open gravel plains, screes, etc., within a radius of at least six miles of the Hudson Bay Post.

SPERMATOPHYTA

Gramineae

ALOPECURUS ALPINUS Sm.

ARCTAGROSTIS LATIFOLIA (Br.) Gris.

*CALAMAGROSTIS sp.—grassy slope above beach, Avatakpatsiak, Havilland Bay, *Bruggemann 152A.*

DESCHAMPSIA BREVIFOLIA Br.—Polunin, page 55.

DUPONTIA FISHERI var. ARISTATA Malte

ELYMUS ARENARIUS L. var. VILLOSISSIMUS (Scribner) Pol.

*FESTUCA BAFFINENSIS Pol.—gravel plain, around buildings at Hudson Bay Post, Repulse Bay, *Bruggemann 161.*

F. BRACHYPHYLLA Schultes

HIEROCHLOË ALPINA (Swartz) R. & S.

H. PAUCIFLORA Br.—Polunin, page 45.

PLEUROPOGON SABINEI Br.—known only from Igloolik (Polunin, page 64), and from the west coast of Melville Peninsula: in running water, Committee Bay, *Woodruff 42B.*

POA ABBREVIATA Br.—Polunin, page 65.

P. ALPINA L.—Polunin, page 76.

P. ARCTICA Br.

P. GLAUCA Vahl

PUCCINELLIA ANGUSTATA (Br.) Rand & Redfield—Polunin, page 86.

P. PAUPERCULA (Holm) Fernald & Weath.—a specimen collected on Parry's second expedition is presumed by Polunin (l.c. page 84) to have come from Melville Peninsula. The following two collections, however, represent the first authentic records for this area: sandy gravel among boulders along beach, Ross Bay, *Cody 1459;* in marsh, Committee Bay, *Woodruff 26.*

*P. PHRYGANODES (Trinius) Scribner & Merrill—shoreline below highwater mark near the Hudson Bay Post, Repulse Bay, *Bruggemann 44.*

*P. VAHLIANA (Liebmann) Scribner & Merrill—sand beach, Committee Bay, *Woodruff 27.*

TRISETUM SPICATUM (L.) Richter

Cyperaceae

CAREX AQUATILIS Wahl. var. STANS (Drejer) Boott (=*C. stans* Drejer)

C. ATROFUSCA Schkuhr—Polunin, page 125; reported by Duman (l.c. page 61) from Repulse Bay.

*C. BIGELOWII Torrey—gravel slope, Ikaktalik, Havilland Bay, *Bruggemann 165;* moist sand beach, Committee Bay, *Woodruff 4;* sedge meadow by small lake, Ross Bay, *Cody 1466, 1468;* moist soil on rocky hillside, Ross Bay, *Cody 1448;* reported by Duman (l.c. page 58) from Igloolik.

*C. CAPILLARIS L.—reported by Duman (l.c. page 70) from Winter Island.

C. GYNOCRATES Wormsk.—Polunin, page 112.

*C. HOLOSTOMA Drejer—reported by Duman (l.c. page 61) from Repulse Bay.

*C. LAGOPINA Muhl. (=*C. bipartita* Bell. var. *bipartita; C. Lachenalii* Schkuhr)—sedge meadow by small lake and rocky hillside, Ross Bay, *Cody 1472, 1485;* reported by Duman (l.c. page 41) from Winter Island.

*C. MARINA Dewey (= *C. bipartita* Bell. var. *amphigena* (Fernald) Pol.; *C. glareosa* Wahl. var. *amphigena* Fernald)—shallow soil along shoreline, Ross Bay, *Cody 1439;* reported by Duman (l.c. page 42) from Winter Island and Repulse Bay.

*C. MARITIMA Gunn.—reported by Duman (l.c. page 36) from Igloolik, Winter Island, and Repulse Bay.

C. MEMBRANACEA Hook.

C. MISANDRA Br.—including f. OCHROLOCHIN Ost.

C. NARDINA Fries

*C. NEUROCHLAENA Holm.—reported by Duman (l.c. page 43) from Repulse Bay.

*C. RARIFLORA (Wahl.) Sm.—reported by Duman (l.c. page 64) from Winter Island.

C. RUPESTRIS Bell.—Polunin, page 119; reported by Duman (l.c. page 28) from Repulse Bay.

*C. SALINA Wahl. var. SUBSPATHACEA (Wormsk.) Tuck.—reported by Duman (l.c. page 56) from Repulse Bay.

*C. SAXATILIS L. var. MAJOR Olney (= *C. physocarpa* Presl)—reported by Duman (l.c. page 54) from Repulse Bay.

C. SCIRPOIDEA Michaux

*C. URSINA Dewey—reported by Duman (l.c. page 27) from Winter Island and Repulse Bay.

*C. VAGINATA Tausch—sedge meadow by small lake, Ross Bay, *Cody 1470;* reported by Duman (l.c. page 66) from Winter Island.

ERIOPHORUM ANGUSTIFOLIUM Honckeny—including var. ALPINUM Gaudin

*E. BRACHYANTHERUM Trautv.—sedge meadow by small lake, Ross Bay, *Cody 1467.* Although not reported for the Eastern Arctic by Polunin specimens have been seen from Coral Harbour, Southampton Island and Chesterfield Inlet on the west coast of Hudson Bay.

*E. CALLITRIX Cham.—margin of pond Repulse Bay, *Bruggemann 156;* marshy spot on gravel plain, Repulse Bay, *Bruggemann 168.*

E. SCHEUCHZERI Hoppe
E. SPISSUM Fernald
*KOBRESIA MYOSUROIDES (Villar) Fiori & Paol. (= *K. bellardi* (All.) Degland)—manured soil around ground squirrel burrow, Ross Bay, *Cody 1482.*

Juncaceae

*JUNCUS ALBESCENS (Lange) Fernald—moist sand beach, Committee Bay, *Woodruff 33C;* sedge meadow by lake, Ross Bay, *Cody 1471.*
J. BIGLUMIS L.—sand beach, Committee Bay, *Woodruff 33A;* previously recorded only from Igloolik (Polunin, l.c. page 146).
*J. CASTANEUS Sm.—moist sand beach, Committee Bay, *Woodruff 33B.*
LUZULA CONFUSA Lind.
L. NIVALIS (Laest.) Beurling

Liliaceae

*TOFIELDIA PUSILLA (Michaux) Persoon (= *T. borealis* Wahl.)—sedge meadow by lake, and rocky hillside, Ross Bay, *Cody 1415, 1473.*

Salicaceae

SALIX ALAXENSIS (And.) Coville var. OBOVALIFOLIA Ball
S. ARCTICA Pallas var. BROWNEI And.
*S. ARCTOPHILA Cock.—sedge meadow by lake, and rocky hillside, Ross Bay, *Cody 1447, 1492;* wet marshy slope below Eskimo ruins, Nauja Inlet, Repulse Bay, *Bruggemann 82.*
S. HERBACEA L.
S. RETICULATA L.
S. RICHARDSONI Hooker—Polunin, page 169.

Polygonaceae

OXYRIA DIGYNA (L.) Hill.
POLYGONUM VIVIPARUM L.

Caryophyllaceae

*ARENARIA PEPLOIDES L. var. DIFFUSA Horn.—gravelly shore at high water mark, Ikaktalik, Havilland Bay, *Bruggemann 119;* sandy seashore at high water mark, southeast of Hudson Bay Post, Repulse Bay, *Bruggemann 167.*
A. ROSSII Br.
A. RUBELLA (Wahl.) Sm.
A. SAJANENSIS Willd.—Polunin, page 204.
CERASTIUM ALPINUM L.
C. REGELII Ost.—Polunin, page 191.
LYCHNIS APETALA L. var. NUTANS Boivin (= *L. apetala* sensu Polunin)
L. TRIFLORA Br. (= *L. furcata* sensu Polunin)
SAGINA SAGINOIDES (L.) Dalla Torre—Polunin, page 206.
SILENE ACAULIS L. var. EXSCAPA (All.) DC.
STELLARIA CRASSIPES Hulten (= *S. longipes* sensu Polunin pro parte)
S. HUMIFUSA Rottboell
S. LAETA Rich. (= *S. longipes* sensu Polunin pro parte)

Ranunculaceae

*RANUNCULUS CODYANUS Boivin—along shore of pond on island opposite Roman Catholic Mission, Repulse Bay, *Bruggemann 79.*
R. HYPERBOREUS Rottboell
R. LAPPONICUS L.
R. NIVALIS L.
R. PEDATIFIDUS Sm. var. LEIOCARPUS (Trautv.) Fernald—moist soil around ground squirrel burrow, Ross Bay, *Cody 1429;* wet marshy slope, Nauja Inlet, Repulse Bay, *Bruggemann 36.* Although these are the first authentic records, a specimen collected by Edwards on Parry's second voyage is presumed to have come from this area (Polunin, l.c. page 221).
R. PYGMAEUS Wahl.
R. SULPHUREUS Sol.—Polunin, page 217.
*R. TRICHOPHYLLUS Chaix var. ERADICATUS (Laest.) Drew—shallow pond on gravel slope, Repulse Bay, *Bruggemann 1.*

Papaveraceae

PAPAVER RADICATUM Rottboell—including forma ALBIFLORUM Hartz (nom. emend. f. albiflora Hartz. Medd. Groen. 18: 330, 1895); crevice of igneous rock, Ross Bay, *Cody 1483.*

Cruciferae

ARABIS ARENICOLA (Rich.) Gelert
BRAYA PURPURASCENS (Br.) Bunge
CARDAMINE BELLIDIFOLIA L.
C. PRATENSIS L.
COCHLEARIA OFFICINALIS L.—including vars. ARCTICA (Schlecht.) Gelert and OBLONGIFOLIA (DC.) Gelert.
DRABA ALPINA L.
D. CINEREA Adams—Polunin, page 245.
*D. CRASSIFOLIA Graham—shallow soil among igneous boulders, Ross Bay, *Cody 1423, 1451.*
D. FLADNIZENSIS Wulfen
D. GLABELLA Pursh

*D. NEMOROSA L. var. LEJOCARPA Lindblom—well established in rich, disturbed soil near site of old cold frame in vicinity of the Hudson Bay Post, Repulse Bay, *Bruggemann 76.* A few plants were also noted about the Hudson Bay Post store. Previously unrecorded for the Eastern Canadian Arctic.
D. NIVALIS Liljeblad
D. SUBCAPITATA Adams
EUTREMA EDWARDSII Br.
LESQUERELLA ARCTICA (Wormsk.) Watson
PARRYA ARCTICA Br.—Polunin, page 250.

Saxifragaceae

CHRYSOSPLENIUM TETRANDRUM (Lund) Fries (= *C. alternifolium* L. var. *tetrandrum* Lund)
SAXIFRAGA AIZOIDES L.
S. CAESPITOSA L.—including forma **multiflora** f. nov.—a varietate typica differt flore pleno, id est staminibus carpellibusque in petalis degeneratis. A striking, many-flowered form found in a small colony on a gravel slope near high water mark on an island opposite the Roman Catholic Mission, Repulse Bay, *Bruggemann 80* (type). It was also noted at Havilland Bay.
S. CERNUA L.
S. FLAGELLARIS Willd.—Polunin, page 265.
S. HIERACIFOLIA Waldstein & Kit.—Polunin page 260.
S. HIRCULUS L.
S. NIVALIS L.
S. OPPOSITIFOLIA L.
S. RIVULARIS L.
S. STELLARIS L. var. COMOSA Retzius
S. TRICUSPIDATA Rottboell—including forma WOODRUFFII Calder.

Rosaceae

DRYAS INTEGRIFOLIA Vahl
POTENTILLA HYPARCTICA Malte var. ELATIOR (Abromeit) Fernald (= *P. emarginata* Pursh)
P. PULCHELLA Br.—Polunin, page 283.
P. RUBRICAULIS Lehmann—Polunin, page 280.
P. VAHLIANA Lehmann

Leguminosae

ASTRAGALUS ALPINUS L.
OXYTROPIS ARCTOBIA Bunge
O. BELLII (Britton) Pal.
O. HUDSONICA (Greene) Fernald
O. MAYDELLIANA Trautv.

Empetraceae

EMPETRUM NIGRUM L.

Onagraceae

*EPILOBIUM DAVURICUM Fischer var. ARCTICUM (Sam.) Pol.—damp depression on gravel slope, Repulse Bay, *Bruggemann 93, 159;* springy areas on rocky hillside, Ross Bay, *Cody 1484.*
E. LATIFOLIUM L.

Pyrolaceae

PYROLA GRANDIFLORA Radius

Ericaceae

ARCTOSTAPHYLOS ALPINA (L.) Sprengel
CASSIOPE TETRAGONA (L.) D. Don
LEDUM PALUSTRE L. var. DECUMBENS Aiton
LOISELEURIA PROCUMBENS (L.) Desvaux—Polunin page 309.
RHODODENDRON LAPPONICUM (L.) Wahl.
VACCINIUM ULIGINOSUM L. var. ALPINUM Big.
V. VITIS-IDAEA L. var. MINUS Lodd.

Diapensiaceae

*DIAPENSIA LAPPONICA L.—margin of rapid stream, Avatakpatsiak, Havilland Bay, *Bruggemann 131.* Apparently rare, at least in the Repulse Bay area where only a single specimen was noted over a period of three months.

Plumbaginaceae

ARMERIA MARITIMA (Miller) Willd. var. SIBIRICA (Turcz.) Lawrence (= *A. labradorica* Wallroth sensu Polunin pro parte)

Boraginaceae

MERTENSIA MARITIMA (L.) S. F. Gray var. TENELLA Fries

Scrophulariaceae

PEDICULARIS CAPITATA Adams
P. FLAMMEA L.
P. HIRSUTA L.
P. LANATA C. & S.
P. LANGSDORFII Fischer—Polunin, page 334.
P. SUDETICA Willd.

Campanulaceae

CAMPANULA UNIFLORA L.

Compositae

*ANTENNARIA ANGUSTATA Greene—river bank, Ikaktalik, Havilland Bay, *Brugge-*

mann 114; rock ledges, Repulse Bay, *Bruggemann 29, 32, 40.*
A. EKMANIANA A. E. Porsild (= *A. labradorica* sensu Polunin)
A. PYGMAEA Fernald—Polunin, page 354.
CHRYSANTHEMUM INTEGRIFOLIUM L.
ARNICA ALPINA (L.) Olin—Polunin, page 365.
CREPIS NANA Rich.—Polunin, page 374.
ERIGERON ERIOCEPHALUS Vahl
E. UNALASCHKENSIS (DC.) Vierh.
MATRICARIA INODORA L. var. NANA (Hooker) Torrey & Gray
SENECIO CONGESTUS (Br.) DC. (= *S. palustris* (L.) Hooker var. *Congestus* (Br.) Hooker)
TARAXACUM LACERUM Greene
T. PHYMATOCARPUM Vahl

NOTES AND OBSERVATIONS

The Barn Swallow at Cambridge Bay, N.W.T.—On June 30, 1950, while the author was making a trip two miles west of Cambridge Bay, a barn swallow *Hirundo rustica erythrogaster* Boddaert was collected. It was identified by the writer and the authorities at the National Museum of Canada. This accidental was taken 600 miles north of Fort Reliance, N.W.T., which locality represents the closest northern record. Although the latter area is well within the tree zone, Cambridge Bay, situated at the southeast corner of Victoria Island, and 150 miles within the Arctic Circle, is over 300 miles beyond the tree limit. The largest plant in the area is a shrubby willow, *Salix arctophila* Cock., which is scattered throughout the area and never exceeds a height of three feet.

Observations indicated no unusual weather conditions. A northerly wind, averaging about 15 m.p.h., prevailed from June 19 until June 24; then it became southerly and the velocity dropped to about 10 m.p.h. This warm front caused a general rise in temperature from a minimum of 31.0°F. on June 24 to a maximum of 48.1°F. on June 27. On June 28, 29, and 30, however, the wind reverted to a northerly direction, but the temperature continued to rise, to a maximum of 53.3°F. Only scattered traces of rain occurred from June 22 to 30, and the relative humidity remained high, fluctuating between 77 per cent and 100 per cent.

With the exception of the barn swallow, all other recorded species were observed by June 20. The majority of the smaller species, particularly the shore birds, arrived from June 10 to June 12, the first warm days of the year. —*GORDON K. SWEATMAN* [1].

Records of the sea lamprey and the silver lamprey from the Canadian waters of the western end of Lake Superior.—I recently reported in this Journal (1950, 64:92-93) the capture of an albino female mudpuppy (*Necturus maculosus* Rafinesque) on May 7, 1949, in Mosquito Creek, near its confluence with the Kaministiquia River, Neebing Township, outside the city of Fort William, Ontario. On May 19, 1950, I received a second albino female of this species which measured 27.5 cm. in length. It had been taken the previous evening in the Kaministiquia River near the outlet of Mosquito Creek. Shortly after being received, this mudpuppy disgorged a silver lamprey (*Ichthyomyzon unicuspis* Hubbs and Trautman) which measured 17.7 cm. in total length. The occurrence of other albino mudpuppies in an area where one had previously been taken was probably to be expected. The inclusion of a lamprey in the diet of *Necturus* would appear unusual although these carnivores prey on all forms of aquatic life.

Neither the mudpuppy nor the silver lamprey can be considered a common local species. During the period 1938-1950, I have been able to collect records of only seven mudpuppies. The silver lamprey has been equally uncommon. Hubbs and Lagler (Fishes of the Great Lakes Region, Cranbrook Inst. Sci., Bull. 26:27) state that it occurs in the "basins of Lake Superior (near west end only)". Dymond (A List of the Freshwater Fishes of Canada East of the Rocky Mountains, Roy. Ont. Mus. Zool., Misc. Publ. No. 1:4, 1947) records this species from the Canadian waters of Lake Superior but Radforth

[1] Student Assistant, Division of Entomology, Science Service, Department of Agriculture, Ottawa, Canada, participating in the Northern Insect Survey.

failed to spot a local record on her distributional map of the species. (Radforth, Isobel. Some Considerations on the Distribution of Fishes in Ontario, Roy. Ont. Mus. Zool., Cont. 25:70, 1947). The first to come to my attention was one taken at Rossport, 120 miles north-east of the Canadian Lakehead, by Wm. Legault, in 1945. On September 17, 1946, my son, David, found a decomposed specimen in Fort William Harbour. In 1950, however, I received for identification, six silver lampreys which had been taken locally. These included a 300 mm. specimen taken on May 17 in the Kaministiquia River and three larvae from the same river on June 25. These larvae and "many more" were clinging to an old tree-trunk dredged from the river bottom. The other two were taken from the MacIntyre River, Port Arthur. One captured on June 3 was attached to a white sucker (*Catostomus commersonnii* (Lacépède), and the second, taken June 16 was parasitic on a sturgeon sucker (*C. catostomus* (Forster). Apprehensive of the spread of the sea lamprey (*Petromyzon marinus* Linnaeus) in the waters of Lake Superior, the Thunder Bay District Fish and Game Association set out six wire lamprey traps in district streams in May-June, 1950. On June 16, a silver lamprey was captured in a trap set in the MacIntyre River.

The presence of the sea lamprey in the lake may account for the increasing numbers of silver lampreys being received for identification. On the other hand there may be a cyclic increase as local fishermen claim that lampreys were very common in the waters of Thunder Bay, fifty years ago. The first sea lamprey to be taken in Thunder Bay, Lake Superior, appears to be one given me on June 26, 1950, by John Goyan. He had found it attached to a 22-pound lake trout (*Cristovomer namaycush* (Walbaum) which he had caught while trolling off Pie Island, on June 25.—*A. E. ALLIN, Fort William, Ontario.*

Occurrence of Tamarack in Central British Columbia.—Henry's "Flora of Southern B.C." and Sudworth's "Forest Trees of the Pacific Slope" give the range of tamarack (*Larix laricina* (DuRoi) K. Koch) as including only the northern part of the province in the vicinity of latitude 59°. This species, however, is known to be fairly common in favorable sites throughout the northern portion of the Province lying east of the Rocky Mountains. Whitford and Craig in "The Forests of B.C." estimated that in 1918 there were 5,000,000 board feet of tamarack in the Peace River Block alone. It does not appear to be generally known that this species is also distributed west of the Rockies in the Prince George district of central B.C.

During the summer of 1950, tamarack trees were noted in several swamps bordering Number 16 Highway near the eastern end of Cluculz Lake, approximately midway between Prince George and Vanderhoof. This locality is roughly 10 miles south of latitude 54° and 90 airline miles southwest of the continental divide.

Although local residents reported large specimens near Bednesti Lake in the same area, those observed by the writer were all of small size and only one exceeded eight inches in diameter. In the marshes close to the highway the stand was thin and many trees appeared to lack vigor. This condition was apparently due to overcrowding in more favorable sites along the swamp margins by a dense growth of black spruce, *Picea mariana* (Mill.) B.S.P.

The only other record for this region was supplied by Ranger C. L. French of the B. C. Forest Service, who reported a few trees near Reid Lake, situated about 15 miles northwest of Prince George, about 20 miles from the Cluculz Lake site. In the course of fairly extensive travel north and east of these localities, no tamarack was found. Several members of the B. C. Forest Service familiar with this species, said that the Cluculz Lake district was the only locality in central B.C. where they had noticed it.

Brink and Farstad[1] have suggested that Douglas fir, formerly a more abundant species in this area, has been largely replaced by spruce.

It is possible that tamarack, has also suffered from the same unfavourable conditions which, in recent times, have brought about the decline of the Douglas fir forests. At any rate, the groups in the Prince George district appear to represent relict stands which are now far removed from the main mass of the species.—*J. GRANT, R.R. 2, Vernon, B.C.*

1) Brink, V.C. and L. Farstad, 1949 "Forest advance in north and central British Columbia." Can. Field Nat. 63:37.

Wintering of Golden-crowned Sparrows *Zonotrichia coronata* (Pallas), at Vancouver, B.C.—On December 26, 1950, I captured and banded two Golden-crowned Sparrows, *Zonotrichia coronata* (Pallas), at my banding station in Vancouver. I was greatly pleased to get these birds as I had not seen them here so late before. Later, on December 31, 1950, I banded one; another on January 8, 1951; two birds on January 19, 1951; four on January 29, 1951; one bird on February 8, 1951; one bird on February 17, 1951; one bird on March 3, 1951, and on March 14, 1951, two birds, making a total of 15 Golden-crowned Sparrows banded during the past winter. These birds were all immature.

The weather during the first week of March was severe with snow and frost, but the birds were seen daily. The bird banded December 31, 1950, was recaptured March 28, 1951, and none were seen after that date. During the usual spring migration the last week in April, there were no birds of this species observed in my area. I heard of other people seeing Golden-crowned Sparrows during the winter. —*Wm. M. HUGHES.*

Some Observations on the Rusty Song Sparrow, *Melospiza melodia morphna* Oberholser.—While engaged in bird banding at my residence in Vancouver, B.C., I noticed early in January actions of Rusty Song Sparrow *Melospiza melodia morphna* Oberholser that led me to believe that the males were establishing territory at this early date. Birds I believed to be males were breaking into partial song and becoming aggressive to others that were likely males. The thought occurred to me that, if possible, I should follow this up.

On January 26, 1951, I captured and banded with regulation band plus a colored band, a song sparrow in my own yard and sexed it as male. This bird, when it got its mate, nested in my neighbour's yard. Across the street in a vacant lot, on January 31, 1951, I took another, banded it and used a different colored band. This was sexed also as male. On the same day, I captured a third at the edge of a small clearing 200 yards southwest from the house, and also banded it with a colored band and sexed it as male. During February I had many opportunities to observe these three birds.

On one occasion, February 8, 1951, all three were in the trap at one time. They were recaptured and the band numbers verified. While feeding in the trap they were not at all quarrelsome, but after feeding and returning to their respective areas, would immediately attack and pursue other song sparrows. The last few days of February and the first week of March were cold with snow and some sunny periods. Even during the inclement weather, on sunny days they would fly to their favourite perch and sing and be aggressive. Their song was becoming more complete, but did not reach the stage of being repeated frequently until March 13.

On March 17, I saw a male courting a female but she was shy. On March 27, all these males had mates and females were carrying nesting material. Two of the nests were not found as they were in blackberry patches and I was unable to get to them.

The nest of the bird that bred in my neighbor's yard was difficult to find and it was not until April 16 that it was located. It had young in it and they left the nest on April 17. This nest was in a Western Yew tree (*Taxus brevifolia* Nutt.) 6 feet 2½" from the ground and, more remarkable still, it used the last year's nest of a Russet-backed Thrush, *Hylocichla ustulata ustulata* (Nuttall). All males brought their young to feed at the back porch of the house, where there is a trap and feed at all times.—*Wm. M. HUGHES.*

Nighthawk Stamina.—On the afternoon of Tuesday, July 31, a wounded nighthawk was brought into my office in Ottawa, Ontario. It had apparently been shot in the wing, above the shoulder, and in addition one eye was closed. The bird had been found earlier that day on the grass outside National Defence Headquarters. The finder had washed the wound, which bled quite a lot. When it was brought to me the bleeding had stopped, and as the wing was not broken it was decided to leave the bird on the grass in the central courtyard of the building, where it would be out of the way of cats, and see how it got on.

The next day it was still there and the injured eye was beginning to open. It seemed probable that the bird would recover if it did not die of starvation first, so I took it home and put it in a large wooden box, hoping to be able to induce it to eat. Acting on advice from the Canadian Wildlife Service, I tried to catch moths for it. The weather was cool, however, and only one moth was caught,

together with a few flies of different kinds. The nighthawk not only refused to eat them, it completely ignored them. It is possible that they were not the right kind of insect, but I had the impression that the bird did not recognize them as food at all.

In spite of its refusal to eat the nighthawk got steadily better. By Wednesday evening the injured eye was wide open, and sometime on Thursday the bird sat up on its feet instead of resting flat on its breast. The wounded wing was held at an unnatural angle out from the body, but it was able to flap it quite vigorously when frightened by my approach. On Thursday evening I put it on the windowsill to see if it would fly, but it did not move.

On Friday evening I noticed that for the first time the bird was walking around the box with no incentive of fear, so I put it on the windowsill again. It made no effort to move until I went to pick it up again, when it took off and flew away. I lost sight of it fairly soon, but as long as I could see it it appeared to be flying strongly. It had then been at least 80 hours without food.—*MOIRA DUNBAR.*

Golden-winged Warbler, Vermivora chrysoptera (Linnaeus), in Ottawa.—On May 19, 1951, at about 7 a.m., I observed a male Golden-winged Warbler in the lower part of the Dominion Arboretum and Botanic Garden, Ottawa. The bird was busy feeding in a small tree and I had an excellent view with X9 binoculars at a distance of about 25 feet for some 10 minutes. The black throat and eye-patch, yellow cap and wing-patch, and the white underparts were most distinct, and I had no hesitation in making the identification. As far as I can ascertain this is the first record for the Ottawa district.— *T. F. T. MORLAND, Ottawa.*

Lyncnia americana (Leach) (Diptera: Hippoboscidae) **from a Great Horned Owl at St. Thomas, Ontario.**—Ten female hippoboscid flies, now preserved in fluid in the collections of the University of Western Ontario, were taken from a Great Horned Owl (*Bubo virginianus*) on December 1, 1937 by Mr. M. S. Ferguson at St. Thomas, Ontario. They have been identified as belonging to the genus *Lynchia* (key—Curran, 1934) and the species *americana* (Leach) (key—Bequaert, 1945). Ferris (1927) records that this ectoparasite appears to be constantly associated with owls and Bequaert (1945) reports that it is most commonly found on diurnal and nocturnal birds of prey, but gives records of its occurrence on other birds.

References

Bequaert, J. 1945 Notes on Hippoboscidae. 19. Additions to the larger species of *Lynchia,* with descriptions of two new species. Psyche, 52: 88-104.

Curran, C. H. 1934 The families and genera of North American Diptera. Ballou Press, New York.

Ferris, G. F. 1927 Some American Hippoboscidae (Diptera Pupipara). Canadian Entomologist, 59: 246-251.

—W. W. JUDD, Department of Zoology, University of Western Ontario, London, Ontario.

An Account of Wolverine Attacking Mountain Goat.—On August 1, 1951, a topographical survey party operating in the vicinity of Nadina Mountain in central British Columbia, witnessed the following incident, as recounted by Mr. John Mathews, a member of the party.

"While doing some transit work on the high slopes of the mountain, we observed a band of thirty-three mountain goat (nannies and kids), suddenly take flight along the mountain side. Using a 28 power transit I observed a small short-legged animal rushing in hopeless pursuit. This animal I mistook for a hoary marmot, and upon its abandonment of the chase the party resumed work.

Four hours later, the goats again stampeded, this time splitting into two bands, the same attacker close upon a band of fourteen, where, in the initial rush a large nanny was seized by the hind leg. The goat stopped, the attacker immediately released its jaws from the leg and tried for the throat, but the nanny successfully eluded this rush, tossing the attacker some fifteen to twenty feet with her horns. Then followed an interlude of parrying, the goat keeping head on, as the predator circled. Finally it quit the scene after twenty minutes of fruitless effort."

The attacking animal was undoubtedly a wolverine from Mr. Mathews' description, and an attack upon mountain goat seems worthy of record.—*C. J. GUIGUET, Provincial Museum, Victoria, B.C.*

REVIEWS

Handbook of the North Dakota Plants. *By O. A. Stevens, North Dakota Agricultural College, Fargo, North Dakota, 324 pp., 319 illustrations and 1 color plate, 1950. First publication of the North Dakota Institute for Regional Studies. ($4.50).*

This is a fine flora covering the 1143 species recorded from North Dakota with illustrations for about one-fourth of the species. Each species is keyed out and briefly described with abundant notes on habitat and distribution within the state. A short introduction gives a brief physiographic description of the state, a chapter on name of plants, another on descriptive botany, a series of distributional maps covering about 60 species, etc. This book will prove most useful to any botanist interested in the flora of North Dakota or of adjacent parts of Canada, Montana and South Dakota. To make it easier for non-botanists, metric measurements are often supplemented by their equivalent in English inches or feet.

Considering the circumstances under which this book was produced, it is certainly a most commendable piece of work. The author is not a taxonomist, but his experience with plants and plant identifications covers a period of about 40 years, with weeds as his primary field of study. The herbarium and probably also the library on which this book was based appear to have been barely adequate for the purpose. According to the latest report, the herbarium is only 30,000 sheets strong, of which about 20,000 are from North Dakota. If 20,000 sheets is a fair enough representation for a flora of some 1143 species, the additional 10,000 from outside North Dakota were obviously not adequate to enable the author to relate the flora of his state to the flora of the rest of the world. For example, one sheet of *Geum macrophyllum* W. from around the Gulf of Saint Lawrence or from the Rockies woud have made it clear that the specimens from North Dakota that are identified as *G. macrophyllum* W. are misidentified and that the latter species is absent from the state. Indeed Dr. Stevens seems to have been aware that something was wrong for he writes about that species as follows:

"*Geum macrophyllum* Willd. Largeleaved "Avens. Similar to last and not readily dis- "tinguished from it. Specimens from 6 eastern "counties have been referred to this, but I am "unable to recognize them as distinct from "the preceding species."

Quite a few similar cases could be listed. In many other cases the author had to rely on published opinions of other authors such as the following statement under *Thalictrum venulosum* Trel.:

"Our plants have often been called *T. "dioicum* L., but the most recent authority ". . . . considers that a different species."

Of course one specimen of genuine *T. dioicum* L. would have made obvious the distinctiveness of these two species, only one of which occurs in North Dakota.

Fortunately the author often lets the reader know about those yet unsolved problems, a feature which, for me at least, greatly increases the interest of this useful handbook. —B. BOIVIN.

Museum Pictorial. No. 1. Nature Photography with Miniature Cameras. *By Alfred M. Bailey. Denver Museum of Natural History. Denver, Colo. Feb. 1951. 64 pp.*

This is the first number of a publication to be issued at irregular intervals, designed to fill "a definite need for an outlet for the thousands of photographs made of departmental activities of natural history museums". An enclosed slip offers the first number at 50 cents or the projected first five at $1.50. It is hoped to issue at least four numbers a year, ranging probably between 16 and 96 pages.

This first number consists principally of a selection of the author's photographs and a short text that is a brief history of his 40 years' experience in wildlife photography. The format is attractive. The text is in no sense a technical manual, but the beginner will find valuable suggestions on equipment and general procedure. One point that the reviewer would have liked to see emphasized is the value of synchronized flash in allowing adequate depth of focus in studies of nesting birds. The story behind some of the illustrations appears in the text, and the reviewer was greatly interested to read, at last, that behind Bailey's famous picture of the two snowy owls flying toward the camera.—D. B. O. SAVILE.

Dawn Song and All Day. *Vol. 1, No. 1, pp. 1-11; No. 2, pp. 12-21; No. 3, pp. 22-31;*

No. 4, pp. 32-44; September, 1949 - March, 1951. Bird Research Station, Glanton, Northumberland, England.

Students of bird song will find this little publication of interest and perhaps will receive from it inspiration to conduct similar studies in their own areas. There is, for example, an account of the dawn chorus, based on observations made from about 550 different points in the British Isles on June 5, 1949. The Song Thrush, *Turdus ericetorum,* is used as the basis of this study. The directional and temporal passage of first dawn songs are described; weather and light conditions are summarized; and the results are compared with a similar study made on June 4, 1933. A study of the dusk chorus is handled similarly. Other articles deal with the length of the singing day; the frequency of bird song and its relationship to gonad size; counts of the total number of songs given by individual birds during a day (a Whitethroat, *Sylvia communis* sang 3,251 times); and several other aspects of bird song are discussed.—W. EARL GODFREY.

Migration of birds. *By Frederick C. Lincoln. U.S. Fish and Wildlife Service, Circular 16, Washington, D.C., 1950; 102 pp. 23 figs. Price 30 cents (U.S.A.).*

This little book is crammed with information on one of the most fascinating of natural phenomena, the migration of birds. It is a very readable summary, written simply and concisely by an eminent authority, of our present knowledge of the subject. A number of quaint old theories propounded to account for several aspects of bird migration go back to the time of Aristotle and some of these are listed. The salient modern theories are presented in more detail and their respective probabilities weighed. In connection with when, how, and where birds migrate are discussed such aspects as seasonal, diurnal and nocturnal migration, movements of species and groups; speed of flight and speed of migration, flight altitude, orientation, segregation during migration; and migration routes (including an account of the main North American flyways). Other phases of the subject treated include the advantages of migration, the evolution of routes, vertical and vagrant movements, the perils of migration, and meteorological influences. The important part bird banding has played in solving many of the mysteries of migration is rightly stressed throughout. Twenty-three drawings by Bob Hines elucidate and decorate the text. There is a useful bibliography. — W. EARL GODFREY.

Dragons in Amber. Further Adventures of a Romantic Naturalist. *By Willy Ley. The Viking Press, New York, 1951; 328 pp., 33 figs.*

Few professional men of science can present their subject in a manner that will interest, much less fascinate, the general reading public. In contrast, the writer who undertakes to "popularize" science usually irritates the scientist with his inaccuracies. Willy Ley is one of the few who can dramatize science without taking liberties with the facts. That he accomplishes this by the simple trick of using narrative form is not to his discredit. He has written books and articles on a variety of scientific subjects, but his favourite field appears to be those phases of biology in which the data are derived partly from the fossil record, partly from studies on present-day life.

The book under review is divided into three parts, the first of which is almost pure palaeontology, the second a mingling of the past and the present, and the third a series of essays on dispersals and immigrations of living organisms. Outstanding are the two first chapters, which recount the history of amber mining. Ley's background fits him to deal with this subject, and his account, fascinating as it is, will also serve as a good general reference. Other chapters discuss the mysterious *Chirotherium* tracks, the beautifully preserved ichthyosaur skeletons in the Jurassic of Holzmaden, and the frozen mammoths of Siberia. "Living fossils" in the plant world are described: the ginkgo, the sequoias, and the cycads. There are the stories of Pere David's deer, the giant panda, and the recently rediscovered takahe *(Notornis)* of New Zealand. The wanderings of eels, camels, various insects, crustaceans, and mollusks, are described. The book closes with an excellent account of Krakatoa and the way in which animal life has reinvaded the remnant of the island since the stupendous explosion of 1883.

Ley's book can be recommended to the amateur naturalist as a source of solid fact delightfully presented, and to the professional biologist or palaeontologist as a relaxing bit of reading from which he is nevertheless sure to learn something he did not know before. — LORIS S. RUSSELL.

Nature through the Year. *By Frances Pitt. Macmillan Co. of Canada Ltd. 1950. 300 pp. and numerous illustrations. $4.00.*

As the title suggests, this book is an account of natural history observations made throughout the year. The chapters are written as weekly notes but they are not simply accounts of observations week by week. Frequently the material discussed bears little relation to the time of year but has been suggested by some timely thought or observation. It is not intended as a scientific discussion but as entertaining reading for the nature lover. In this it succeeds admirably and the author shows long familiarity with her material from personal experience. As a result there is a remarkable amount of information in it which, to the best of this reviewer's knowledge, is free from the myths and misconceptions that frequently beset a popular work of this kind. The style is conversational and rambling and very readable. Both wild and domesticated birds and animals are discussed with most of the emphasis being placed on behaviour, and the insects and flowers are not forgotten. The book is profusely illustrated with many excellent and charming photographs taken by the author herself. These reveal her skill as a nature photographer and add much to the attractiveness of the book. The observations were, of course, made in England and the notes refer principally to English conditions but the book will be enjoyed by nature lovers anywhere. A very few minor typographical errors were noted. — *J. W. GROVES.*

Audubon Water Bird Guide. *By Richard H. Pough; illustrated by Don Eckelberry and Earl L. Poole. Sponsored by National Audubon Society. Doubleday & Co., Inc., Garden City, New York, May 3, 1951. Pp. i—xxviii, 1-352, 48 colored plates, 130 line drawings. ($3.50)*

This is a companion volume to *Audubon Bird Guide,* by the same author, which covered the small land birds. The book here reviewed treats the eastern and central North American bird species in A.O.U. order from the loons, through the petrels, herons, waterfowl, hawks, grouse, shorebirds, gulls and terns, auks, etc., to the pigeons and doves. Although primarily an excellent guide to field identification, its scope is decidedly broader than that. Habits, food, voice, nesting, and range and succinctly but interestingly dealt with. There are data on longevity and weights. We find much information on the reproductive cycle, such as time required for nest construction and incubation, length of time the young remain in the nest after hatching, and how long the young are dependent upon the adults after they leave the nest. The main plumages of the 258 species dealt with are accurately and attractively illustrated in color by Don Eckelberry, and there are as well useful line drawings by Earl L. Poole showing 130 species as they appear in flight.

The foreword contains some good general information on bird study. The front end paper indicates North American continental flyways, furnishes names for each 10-degree square, gives some information on average numbers of sea birds frequenting them, and indicates surface water temperatures. The back end paper indicates North American Life zones and biomes. The book is, then, literally packed with extremely useful information from cover to cover. — W. EARL GODFREY.

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The Canadian Field-Naturalist

Vol. 65 OTTAWA, CANADA, NOVEMBER-DECEMBER, 1951 No. 6

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PLANT COLLECTIONS AT ROSS BAY, MELVILLE PENINSULA, N.W.T. [1, 2]

W. J. Cody

Division of Botany and Plant Pathology,
Science Service, Department of Agriculture,
Ottawa, Canada.

IN THE LATTER PART of July, 1948, while stationed at Coral Harbour, Southampton Island, conducting botanical work in co-operation with the Defence Research Board, the author was privileged to spend four days with a Geodetic Survey party at Ross Bay, off Lyon Inlet in southern Melville Peninsula (66°50'N, 85°00'W).

Specimens were collected at Lyon Inlet by the Parry Expedition in 1821 and by J. B. Angel of the Norcross-Bartlett Expedition in 1933, but it is very unlikely that either party penetrated the inlet as far as Ross Bay. Thus it seems that the collections which are enumerated in this paper are the first to be taken from this locality, which, although touched by salt water, is essentially inland in the peninsula.

Camp was made on the south shore of the Bay, at a point where the surrounding igneous rocky hills rose steeply to a height of almost 150 feet. The shoreline was strewn with boulders. The vegetation here was very sparse, being limited to scattered clumps of *Puccinellia paupercula,* a few plants of *Cochlearia officinalis* var. *oblongifolia* and one patch of about a dozen heads of *Elymus arenarius* var. *villosissimus.*

Above this sparsely vegetated strip the bouldered hillside was covered with shallow but moist soil which supported a more luxuriant and varied vegetation. The bright flowers of *Oxytropis maydelliana* and *Pedicularis capitata* gave a decided yellowish cast to the hillside. In this zone the predominant species were *Oxytropis maydelliana, Empetrum nigrum, Dryas integrifolia, Cassiope tetragona* and *Vaccinium uliginosum* var. *alpinum.* In addition *Pedicularis capitata, Oxytropis bellii, Arctagrostis latifolia* and *Carex misandra* were quite common.

In several places on the hillsides where ground squirrels had thrown up and fertilized the soil around their burrows, *Poa arctica, P. glauca, Elymus arenarius* var. *villosissimus, Kobresia myosuroides, Oxyria digyna* and *Potentilla hyparctica* var. *elatior* were found in luxuriant growth.

Outcrops of bare igneous bed rock were found throughout the area, particularly on the slopes away from the bay. *Dryopteris fragrans, Cerastium alpinum* and *Arenaria rubella* were found in the crevices of this rock.

Behind the shore hills were numerous small shallow lakes bordered by small wet, rocky, hummocky sedge meadows. *Carex bigelowii, C. vaginata, C. lagopina, Eriophorum angustifolium, E. brachyantherum, Juncus albescens* and *Pedicularis sudetica* were quite common in the wetter areas, while *Salix arctophila* was frequent on the hummocks.

The specimens, which are preserved in the Herbarium of the Department of Agriculture, Ottawa, were identified by members of the staff of that institution. The numbers cited in the list are the author's collection numbers.

Uredinales

Melampsora arctica Rostr. On *Saxifraga oppositifolia* L.; *1438.*

Uromyces lapponicus Lagerh. On *Oxytropis maydelliana* Trautv.; *1431.*

Polypodiaceae

Cystopteris fragilis (L.) Bernh.—frequent in shallow soil in protected spots among boulders on hillside; *1512, 1396.*

[1] Received for publication May 2, 1951.
[2] Contribution No. 1107, from the Division of Botany and Plant Pathology, Science Service, Department of Agriculture, Ottawa, Canada.

Vol. 65, No. 5, September-October, 1951, was issued February 21, 1952.

Dryopteris fragrans (L.) Schott—fairly common in protected spots in crevices and among boulders on hillside; *1513, 1430.*

Equisetaceae

Equisetum variegatum Schleich.—beside a small lake in moist shallow sandy soil over igneous rock, and in deep moss; *1500.*

Lycopodiaceae

Lycopodium selago L. forma **appressum** (Desv.) Gelert—scattered to rare in moist shallow soil on the rocky hillsides; *1474.*

Gramineae

Hierochloë alpina (Sw.) R. & S.—scattered in patches in shallow soil and moss in exposed rocky areas; *1450.*

Arctagrostis latifolia (R.Br.) Griseb.—fairly common in moist shallow soil over rock; *1419.*

Trisetum spicatum (L.) Richt.—in very shallow soil on rocky hillside; *1498.*

Poa glauca Vahl—common in moist shallow soil in manured area around ground squirrel burrows but rare elsewhere; *1460, 1464A, 1504.*

Poa arctica R. Br.—common in sandy gravelly manured soil thrown up around ground squirrel burrows and forming mats in shallow soil over igneous rock; *1452, 1453.*

Puccinellia paupercula (Holm.) Fern.—scattered in patches in sandy gravel among the boulders along the beach; *1459.*

Elymus arenarius L. var. **villosissimus** (Scribn.) Polunin—only a small patch of about a dozen heads was found in gravel among boulders along the beach, however a large stand was located on a hillside some distance inland in churned up manured sandy soil around ground squirrel burrows; *1509, 1477.*

Cyperaceae

Eriophorum brachyantherum Trautv.—in a sedge meadow beside one of the small inland lakes; *1467.*

Eriophorum angustifolium Honckeny—fairly frequent in rich moist soil on the rocky hillside and common in the sedge meadows around the small inland lakes; *1424.*

Eriophorum angustifolium Honckeny var. **alpinum** Guadin — scattered in small *Carex* meadow beside small lake; *1469.*

Kobresia myosuroides (Vill.) Fiori & Paol. (*K. bellardii* (All.) Degl.)—scattered in small clumps in churned up manured soil around ground squirrel burrows; *1482.*

Carex marina Dewey (*C. bipartita* Bell var. *amphigena* (Fern.) Polunin—forming a mat in shallow soil over igneous boulders near mouth of small freshet; *1439.*

Carex lagopina Wahl. (*C. bipartita* Bell var. *bipartita)*—in *Carex* meadow beside small lake, and in wet muck in springy area on igneous rocky hillside; *1472, 1485.*

Carex vaginata Tausch—rare; found only in a sedge meadow around a small inland lake; *1470.*

Carex misandra R. Br. f. **ochrolochin** Ost.—fairly common in rich moist soil on the rocky hillside; *1446.*

Carex bigelowii Torr.—fairly common in the sedge meadows around the small lakes but rare in the rich moist soil on rocky hillsides; *1468, 1466, 1448.*

Carex membranacea Hook.—very scattered in moist shallow soil over igneous rock; *1422.*

Juncaceae

Luzula nivalis (Laest.) Beurl.—scattered in rich moist soil on igneous hillside; *1444.*

Luzula confusa Lindeb.—scattered in shallow soil among igneous boulders with lichens, mosses and *Cassiope tetragona; 1476.*

Juncus albescens (Lange) Fern.—scattered in small *Carex* meadow beside small lake; *1471.*

Liliaceae

Tofieldia pusilla (Michx.) Pers. (*T. borealis* Wahl.)—rare; a few scattered plants were found on a hummock in a small sedge meadow, and also in rich moist soil on the rocky hillside; *1473, 1415.*

Salicaceae

Salix alaxensis (Anders.) Cov. var. **obovalifolia** Ball—beside a small freshet on the steep hillside, and on hummocks by a small lake inland; absent elsewhere; *1494.*

Salix arctica Pall. var. **brownei** Anders.—scattered in shallow soil on igneous rock; prostrate; *1420, 1405, 1502, 1440, 1434.*

Salix arctophila Cockerell—in rich moist soil on igneous hillside and on hummocks in sedge meadow by a small lake; fairly common; *1492, 1447.*

Salix reticulata L.—scattered in moist shallow soil over igneous rock; *1408.*

Polygonaceae

Oxyria digyna (L.) Hill—common in moist soil among boulders; *1410.*

Polygonum viviparum L.—frequent in rich moist soil; *1428.*

Caryophyllaceae

Silene acaulis L. var. **exscapa** (All.) DC.—in shallow soil over igneous rock; rare; *1402.*

Lychnis triflora R. Br. (*Lychnis furcata* sensu Polunin)—in moist shallow soil among rocks; rare; *1427.*

Lychnis apetala L. var. **nutans** Boivin—with *Dryas integrifolia, Oxytropis maydelliana* and *Cassiope tetragona* in moist shallow soil on bouldered hillside; rare; *1458.*

Cerastium alpinum L.—a number of elongated specimens were found growing in shade in shallow soil in a crevice of the igneous rock; *1497, 1399.*

Stellaria laeta Rich. (*Stellaria longipes* sensu Polunin pro parte)—scattered in mats in shallow soil over igneous rocks and in crevices; *1403, 1496.*

Arenaria rubella (Wahl.) Sm.—in mossy crevice of igneous rock; rare; *1455.*

Ranunculaceae

Ranunculus pedatifidus Sm. (det. L. Benson)—a single stand of very luxuriant specimens was found in rich moist fertilized soil around a ground squirrel burrow; *1429.*

Papaveraceae

Papaver radicatum Rottb.—in shallow soil among boulders; rare; *1411.*

Papaver radicatum Rottb. forma **albiflorum** Hartz.—a single large plant was found in shallow soil in a rocky crevice; *1483.*

Cruciferae

Cochlearia officinalis L. var. **oblongifolia** (DC.) Gelert—in wet shallow soil over igneous boulders near the mouth of a small freshet and in gravel among boulders along the beach; *1441.*

Eutrema edwardsii R. Br.—in rich moist soil on the hillside and in shallow soil among boulders; *1449, 1412, 1394.*

Cardamine bellidifolia L.—shallow soil among boulders; very rare; *1437, 1488.*

Draba alpina L.—a single small specimen was found in rich moist soil on an igneous ridge; *1443A.*

Draba fladnizensis Wulfen—in mossy crevices; very scattered; *1454.*

Draba crassifolia Graham—collected in both flowering and fruiting condition from moist shallow soil among boulders; rare; *1423, 1451.*

Draba nivalis Lil.—shallow soil among boulders and in crevices; rare; *1495, 1457, 1398.*

Draba glabella Pursh—fairly common in sandy gravelly manured soil thrown up by ground squirrels; *1463.*

Saxifragaceae

Saxifraga rivularis L. forma **hyperborea** (R. Br.) Hook.—in moist rich shallow soil over igneous rock, under an overhanging boulder and in shallow wet soil near the mouth of a small freshet; rare; *1508, 1442.*

Saxifraga cernua L.—scattered in moist shallow soil among igneous boulders; *1426.*

Saxifraga ? stellaris L. var. **comosa** Retz.—a single small immature specimen from rich moist soil on the igneous hillside, is referred to this species; *1443B.*

Saxifraga nivalis L.—in mossy crevices of igneous rock; rare; *1456.*

Saxifraga tricuspidata Rottb.—fairly frequent in shallow soil on igneous rock; *1425.*

Saxifraga oppositifolia L.—scattered in small mats in deep moist moss and in shallow soil over igneous rock; *1438.*

Rosaceae

Potentilla hyparctica Malte var. **elatior** (Abromeit) Fern.—common and very luxuriant in churned up manured sandy soil around ground squirrel burrows as well as in shallow soil among igneous boulders on the hillside; *1480, 1416.*

Dryas integrifolia Vahl—forming extensive mats in shallow soil over igneous rock; *1414.*

Leguminosae

Astragalus alpinus L.—scattered in shallow soil over igneous boulders; *1432.*

Oxytropis hudsonica (Greene) Fern.—very common on one hillside in shallow soil over igneous boulders; *1505, 1491.*

Oxytropis maydelliana Trautv.—very common in open areas on hillsides in shallow soil over igneous boulders; at the time of collection (July 19) the flowers gave the whole hillside a yellow cast; *1431.*

Oxytropis bellii (Britton) Pabiline—fairly common in shallow soil over igneous boulders on the hillsides; *1506, 1400.*

Empetraceae

Empetrum nigrum L.—prostrate on shallow soil over igneous rock; common; *1401.*

Onagraceae

Epilobium latifolium L.—fairly common in shallow soil among igneous boulders; *1413.*

Epilobium davuricum Fisch. var. **arcticum** (Samuelsson) Polunin—found only in muck in springy areas on igneous rocky hillside; *1484.*

Pyrolaceae

Pyrola grandiflora Radius—one flowering specimen and about fifty rosettes were found in shallow black soil in an exposed position on top of an igneous ridge; *1507.*

Ericaceae

Ledum palustre L. var. **decumbens** Ait.—fairly common in shallow soil over igneous rock; *1404.*

Rhododendron lapponicum (L.) Wahl.—moist springy area on rocky hillside; *1486.*

Cassiope tetragona (L.) D. Don—decumbent on shallow soil over igneous rock; very common; *1417.*

Arctostaphylos alpina (L.) Spreng.—forming a mat in shallow soil over boulders, and in moss over igneous rock; *1489, 1461.*

Vaccinium uliginosum L. var. **alpinum** Bigel.—along the banks of a small freshet this species reached a height of 6 inches, elsewhere in shallow soil over the rocks it was prostrate; *1435.*

Vaccinium vitis-idaea L. var. **minus** Lodd.—shallow soil over igneous rock; *1436.*

Scrophulariaceae

Pedicularis sudetica Willd.—in wet muck in a sedge meadow beside a small inland lake; *1465.*

Pedicularis capitata Adams—common in moist shallow soil on the hillsides; *1418.*

Campanulaceae

Campanula uniflora L.—in shallow soil among boulders; rare; *1395.*

Compositae

Erigeron eriocephalus Vahl—found only in churned up manured sandy soil around ground squirrel burrows; *1478.*

Antennaria ekmaniana A. E. Porsild — in churned up manured sandy soil around ground squirrel burrows and in shallow soil over igneous rock; *1479, 1499.*

Chrysanthemum integrifolium Rich. — scattered to rare in rich moist shallow soil over igneous rocks and in shallow soil among boulders; *1490, 1397.*

Taraxacum phymatocarpum Vahl—a number of very luxuriant specimens were collected from rich moist soil on the hillside; rare; *1409.*

TWO NEW SPECIES OF OENOTHERA[1]

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IN CONNECTION with an extensive monograph of the genus *Oenothera* which is now in preparation, two distinctive forms are here described as new species. The status of species, microspecies and varieties in this genus has been considered at length in that monograph, to which reference should be made. These two species are by-products which were not prepared in time for inclusion in the monograph, where they are simply referred to by name. Their description is as follows:

O. apicaborta n. sp.

This remarkable species was grown at the Courtauld Genetical Laboratory, Regents Park, London, in 1938 and 1939 from seeds collected between the railway and St. Maurice, near Les Piles, Champlain County, Quebec, by the late Prof. Marie-Victorin and Rolland-Germain on August 12, 1936. It is represented in their collections by Herb. Sheet 51, Aug. 12, 1936. In 1938, 35 plants were grown by me from seeds in capsules on this sheet, as culture 42.38. They were uniform, with short, narrow leaves. From seeds of one of these plants selfed, 18 seedlings germinated in 1939 and 17 came to flower as culture 45.39. They were of the same type as the parent culture. The following description is from notes on the rosettes in both years and a full study of the 1938 culture by Dr. W. R. Philipson, of the British

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Fig. 1 **O.apicaborta** n.sp.
Les Piles (Champlain Co.), Que. Culture 45.39.

Museum (Natural History), and myself. The photograph (Fig. 1) was taken in 1939.

Rosette leaves medium green, subspatulate, acute, 19-25 cm x 39-44 mm, smooth, midrib broad, white or ± pink, margin finely waved, distantly repand-denticulate with obscure red teeth, repand-dentate with green teeth below, narrowed to almost unmargined petiole *ca.* 8 cm long. Bearing scattered minute appressed puberulence, more sparse on lower surface, no long hairs; rare liver-coloured spots.

Central stem erect, short (*ca.* 2 ft.) with dense terminal inflorescence *ca.* 5 cm long, which aborts, leaving a dead stem end, so that only 1 or 2 or frequently no flowers are produced on the central stem. This is true of every plant, but of no other *Oenothera.* A ring of short, ascending basal branches is produced. Following abortion of the stem apex, a short cauline branch is developed from every leaf axil, those just below the aborted apex being exceptionally long (see Fig. 1). These bear numerous flowers. The cauline branches are ± red and bent at the tip, although the central (aborted) stem-tip remains erect.

The stem is strongly ribbed, the ribs red, especially below, subglabrous with sparse long hairs from green papillae and sparse puberulence. Leaves horizontal, narrow = lanceolate, 13.5 cm x 25 mm, margin repand-denticulate above, repand-dentate below, glands green, midrib pink in lower half of leaf, pubescence same as on rosette leaves. The leafy short shoots arising in every axil each bear a terminal inflorescence of many young buds. The terminal rosette of the main stem always aborts, the lateral branches then grow out. The inflorescence is dense, never expanding. Ovary 16 x 2.5 mm, with scattered long hairs without papillae, scattered erect pubescence and sparse puberulence. Hypanthium 16-20 x 2 mm, yellowish green, subglabrous. Bud-cone 14 x 5 mm, squarish, yellowish below, greenish above, pubescence as on ovary, but with rare, very small, pink spots; sepal tips 2 mm, green, very slender, touched with red. Flower opening out, petals flabby, 15 x 17 mm, overlapping; filaments *ca.* 10 mm, arcuate, anthers 4 mm; stigma lobes 5 mm, 14 mm above hypanthium, a unique condition for flowers of this size.

This extraordinary species is easily recognized by the aborting stem tip and the many short cauline branches, as well as the narrowish leaves with frequently waved margins. The aborted stem tip was at first regarded as the effect of some disease produced by a fungus or a virus. But this interpretation was finally excluded, because (1) the condition applies equally to every plant, (2) it was repeated in exactly the same way in the second generation from seeds, (3) it was confined always to the central stem and never appeared on a side branch and (4) such a condition has never been seen among the tens of thousands of Oenotheras grown from a hundred or more other localities. This spontaneous abortion appears to be unique among flowering plants. It can only be compared with various hereditary diseases in man, in which certain muscles or certain parts of the central nervous system, or both, undergo spontaneous degeneration. Examples are peroneal atrophy, macular degeneration, cerebellar degeneration, Huntington's chorea and various forms of muscular dystrophy (see Gates, 1946, Chapters XXII and XXIII). Inherited degeneration of the stem apex when the plant has reached a certain height appears to be directly comparable with the degeneration of certain muscular or nervous tissues when the individual has reached a certain age which may be long after adulthood. It would be of great interest to see how this condition in *Oenothera* is inherited in crosses. The original culture has been lost but can probably be obtained again from the original locality. Herbarium sheets from these cultures were destroyed in the war.

Although this is perhaps the first time that apical stem abortion has been described as a specific character, yet tissue abortion undoubtedly takes place normally in plants to an extent not previously realized. My friend, Prof. R. H. Wetmore, has recently directed my attention to a condition in *Cercidiphyllum japonicum* in which, on all the branches, the terminal portion (several inches in length) regularly aborts, followed by outgrowth of lateral shoots from the axils below. Bell (1950) has described a somewhat similar condition in the Canadian blueberry, *Vaccinium angustifolium* Ait. var. *laevifolium* House. The growth of vegetative branches is terminated by the death of the apical meristem accompanied by rapid development of adjacent meristematic tissue into a shoot, while the flowering branches remain short and abort after producing a cluster of berries.

Diagnosis : **O. apicaborta** sp. nov.

Folia radicalia mediocriter viridia, subspathulata, acuta, circa 20 cm longa x 40 mm lata, levia; costa lata, alba vel punicea; margo remote repando-denticulata; cum maculis raris coloris jecoris. Caulis erectus, brevis; inflorescentia terminalis, *ca.* 5 cm longa, demoriens, tunc in axillis omnium foliorum caulinorum excrescat ramus. Folia anguste lanceolata, circa 13.5 cm longa, 25 mm lata. Petala flaccida, 15 mm longa; stigma 14 mm supra hypanthium.

O. magdalena n. sp.

This distinct species is described from two cultures (65.38 and 50.39) grown from seeds collected by Miss Marcelle Gauvreau in 1934 at Havre-aux-Maisons in the Magdalen Islands in the Gulf of St. Lawrence. The descriptive notes are partly by Dr. W. R. Philipson. The rosette leaves are dark green, rather long and narrow (23 cm x 35 mm) with white midribs, blotches of pale green on margin and rare large liver spots. The margin is strongly waved, especially in the younger leaves, subentire with small green marginal glands. In the petiole the broad midrib is very narrow-margined. Stem short, 31-34 in., erect or slightly bent at tip, ribbed, not brittle. A ring of very long basal branches, suberect, equalling the central stem, as in *O. Hazelae* var. *parviflora* (Fig. 24 in Gates 1936). Stem light green, with faint patches of pale red, scattered long hairs from small red papillae and appressed puberulence. Leaves smooth, elliptical-lanceolate, ascending or horizontal, 13-19 cm x 29 mm, midribs white, margin obscurely repand-denticulate above, repand-dentate below with obscure green glands, both surfaces subglabrous with minute appressed puberulence. Apex of inflorescence flat, not comose. Ovary 14-15 x 3 mm, with long ascending hairs from minute red papillae and appressed puberulence. Hypanthium 20-22 x 2 mm, *pink throughout before and after anthesis,* sparse long hairs without papillae, erect and appressed puberulence. Bud-cone 10-12 x 4-5 mm, green becoming yellow with small red patches. Sepal tips 4 mm, green, subterminal, erect or spreading. Petals 12-13 x 12 mm, filaments 7-9 mm, anthers 4-5 mm, stigma lobes 3-5 mm, 5 mm above hypanthium.

The pink hyanthia have not been observed in any other *Oenothera,* but Bartlett (1914) described *O. rubescens* from Nantucket with reddish buds and hypanthia. In foliage and habit *O. magdalena* shows resemblance to *O. ammophiloides* Gates and Catcheside (see Gates, 1933) to which it is no doubt related. *O. ammophiloides* was originally described from Guysborough, Nova Scotia, from seeds collected by Prof. Jacques Rousseau. *O. magdalena* differs in (1) the pink hypanthium, (2) smaller flowers (petals 12-13 x 12 mm instead of 18 x 23 mm), (3) sepals green, without red papillae, (4) stems erect or suberect. It belongs to the series of forms in Eastern Canada, which is adapted to coastal conditions, extending along the coast of Nova Scotia and the Gulf of St. Lawrence. *O. Hazelae* and its var. *parviflora* (see Gates, 1936) are also related to *O. magdalena* but they are partly coastal and partly inland.

A number of specimens belonging to this species from the Magdalen Islands are in the Gray Herbarium, from collections made

Table 1. Measurements of eight specimens of *O. magdalena* in Gray Herbarium

	Bud cone	Sepal tips	Midleaf
1.	10 mm	2 mm	8 cm x 24 mm
2.	20 mm	4 mm	15 cm x 27 mm (long petiole)
3.	14 mm	4 mm	9.5 cm x 35 mm (long petiole)
4.	9 mm	5 mm	5.5 cm x 9-11 mm (very short petiole)
5.	8 mm	2 mm	4 cm x 6 mm (very short petiole)
6.	8 mm	1 mm	7.5 cm x 8 mm (very short petiole; liver spots on leaves; red stripes on buds)
7.	6 mm	2 mm	7.5 cm x 10 mm (no liver spots; few red papillae on buds)
8.	12 mm	2 mm	6-8.5 cm x 10-12 mm (no liver spots on leaves; few red papillae on buds)

in 1912 by Messrs. Fernald, Long and St. John. They show numerous variations which are listed in the accompanying table. These plants differed mainly in length of bud cone and of sepal tips; also in leaf measurements, length of petiole, presence of red stripes or red papillae on the buds, and presence or absence of liver spots on the leaves. These variations are all within the local population, but none of them, except the red papillae on the buds in certain specimens, bring the phenotype nearer to *O. ammophiloides* or any other species. Superficially they resemble a hybrid swarm, but owing to the self-pollination and chromosome catenation in *Oenothera* they cannot be a hybrid swarm in the usual sense of a freely intercrossing population. *O. magdalena* belongs with the coastal species and varieties extending from Guysborough, Nova Scotia, around the Gulf of St. Lawrence and the Gaspé Peninsula. The detailed description applies particularly to one microspecies.

Diagnosis: **O. magdalena** sp. nov.

Folia radicalia atroviridia, sublonga et subangusta (23 cm longa x 35 mm lata); cum maculis raris magnis coloris jecoris; costa alba, infra lata; margo valde undulata praecipue in folia juvenilia, subintegra cum glandulis parvis viridibus. Caulis brevis, erectus vel apice leviter declinatus, ramis radicalibus longis instructus, leucoviridis, rare rubrotuberculatus. Folia plana, elliptico — lanceolata (13-19 cm longa, 29 mm lata). margine obscure repando-denticulata supra repando-dentata infra cum glandulis viridibus obscuris, utrinque subglabra. Apex in florescentiae planus, non comosus. Ovarium minute rubropapillatum, hypanthium ante et post anthesium puniceum. Alabastra viridia demum lutea, cum maculis parvis rubris. Petala 12-13 mm longa, stigma 5 mm supra hypanthium.

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FLORAL LIST OF THE MORTLACH DISTRICT, SOUTHERN SASKATCHEWAN [1]

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THE DISTRICT COVERED in this list centres in the village of Mortlach, about 30 miles west of the city of Moose Jaw, Sask. It includes eight whole (twps. 16 and 17, range 29, W. 2nd meridian; twps. 16, 17 and 18, ranges 1 and 2, W. 3rd) and two broken townships half a mile wide (twps. 16 and 17, range 30 W. 2nd). A map showing the topographical features of the area and its position in Saskatchewan accompanies the list (fig. 1).

The list is based on collections made by the writer in the summer of 1950, and at present in his possession. It contains 491 species and varieties, although it is felt that the genera *Salix, Carex* and *Poa* are not fully covered.

1 Received for publication Dec. 4, 1950.

Relief. The dominant topographical feature is the Missouri Coteau, a range of morainic hills extending northwest across southern Saskatchewan from the American boundary, in this area forming a semicircle a few miles south and west of Mortlach. At its foot the plains of the second prairie steppe extend northeastward, while beyond its crest a morainic upland continues southwestward to the basin of the former glacial lake now occupied by Lakes Chaplin and Johnstone. The Coteau rises considerably above the second steppe: elevation of steppe at Mortlach station, 1985 feet; base of Coteau, 2100; lowest crest of Coteau, 2300; average for the crest, 2400 to 2500; highest summit in the area, 2600 feet.

Drainage. Upon the Coteau the knob-and-kettle topography exhibits no definite surface drainage. Numerous pot-holes, sloughs and non-permanent lakes exist, many of them alkaline — that is, saline with sodium sulfate. The northeast face, however, is carved into coulées, several miles long and 100 to 200 feet deep, presumably excavated, considering the present scanty run-off, towards the close of the glacial period (1). For a few weeks in spring, a stream runs out of each coulée across the plain south of Mortlach, converging on Besant creek; at other times only a spring at the head and a dry bed remain.

The channel of Besant creek takes form a mile southwest of Mortlach, where several of these arroyos link up amid alluvial flats; thence it strikes east to join Thunder creek near Caron. Evidently excavated by a former larger river, this valley, though partly filled in by wind-blown sand during subsequent periods of drought, remains deep enough to intercept the water table in a series of bogs and springs along its south side. These springs feed the present creek which, rising 2 miles east of Mortlach, flows less than 4 miles before entering a Moose Jaw city water intake. Possibly the supply is maintained by subsurface flow from a catchment area on the Coteau.

Thunder creek, an intermittent stream occupying a wide and shallow glacial channel (1½ miles wide, 50 feet deep) which drains to the Qu'Appelle, runs southeast across the north edge of the area. The upper end of its valley cuts through the Coteau to the South Saskatchewan River 30 miles above the Elbow, permitting the construction of a Moose Jaw water-supply canal along the valley north of the creek bed. With river water this canal fills an artificial lake a mile north of Caron, known as the "Caron settling basin".

Pelican Lake, an alkaline flat containing water only in spring, occupies an expansion of Thunder creek some six miles northeast of Mortlach. Other playa lakes north of Parkbeg receive local run-off, but, possessing no outlets, are strongly alkaline.

Geology. A cover of glacial deposits, up to 150 feet thick, conceals the bedrock almost everywhere. The second prairie steppe is known from borings to be underlain by the Bearpaw Shale. Beneath the Coteau Moraine the Eastend, Whitemud, and Ravenscrag formations appear from scattered outcrops in coulées to be present in normal order as a bedrock escarpment.

Soils and Glacial Deposits. The soils of the area have been classified on the basis of parent material, named and mapped by the Saskatchewan Soil Survey (1, 2).

The Haverhill association comprises clay loams and loams developed on till. It occurs over all the Coteau and on ground moraine at the base of the Coteau south of Mortlach.

Clay loams and clays of the Echo association, commonly known as "burn-out flats", cover several square miles of the N.W. corner, twp. 16, range 1 W. 3rd. Here till and bedrock (chiefly marine shale) have been eroded out of the coulées to the south and spread out mixed over the plains below. There results an infertile clayey soil studded with small pits and hummocks, supporting a distinctive halophytic flora — e.g. *Atriplex argentea.*

The northern part of the area is occupied by sandy soil of three kinds: Hatton fine sandy loam, developed on sandy glacial lake deposits; coarser dune sands, presumably of like origin but reworked by wind; and Chaplin sandy loam, often gravelly, on glacial outwash and water-resorted till. Such soils, if cultivated, suffer severely from wind erosion; they were reduced to a semi-desert condition during the drouths of 1917-21 and 1929-39. Although now more or less revegetated, first with weeds and later with grass and shrubs, the landscape consists of dunes and wind-eroded pits ("blow-outs"). Many of the pits were excavated down to the water table, normally high on sandy soil. If the water table is high enough (about 5 feet down), trees, notably *Populus Sargentii,* now form part of the cover.

Clay soils on glacial lake deposits — Sceptre association — occupy a few square miles of the S.W. corner, twp. 17, range 1 W. 3rd. Similar heavy alluvial soils, often alkaline, fringe creek bottoms and sloughs.

Climate. Semi-arid conditions hold in this region as elsewhere in southern Saskatchewan. The climate is marked by long cold winters and short hot summers (mean annual temperature around 35°F.), low and widely variable precipitation (around 14 in., maximum normally in early summer), high evaporation (20 to 25 in. annually), and frequent high winds. Moisture is thus the limiting factor in plant growth.

The warm, dry Chinook winds, potent farther west, cool off towards their eastern limit; at Mortlach their temperature seldom rises above 32°F. Hence the snows of winter usually remain till spring.

A local climatic effect probably due to increase of altitude is seen in slightly lower summer daily maxima upon the Coteau. The consequent increase in the ratio precipitation-evaporation is perceptible in the vegetation.

The district lies in the less arid eastern section of the Brown Soil Zone; the presence of grasses characteristic of the Dark Brown Soil Zone, such as *Agropyron dasystachyum* and *Stipa spartea* var. *curtiseta*, marks the transition to this moister zone.

Variations from the prairie vegetation are found in the coulées described earlier and along Besant creek. In the coulées, a moist-climate flora is found on the shaded south and west walls; while those opposite, violently heated in summer, support xerophytes like *Aplopappus Nuttalli, Eriogonum flavum*, etc. Certain species are erratically distributed among coulées; a form may be confined to one coulée, or to several neighboring coulées, for no apparent reason. The Besant valley flora, along with coulée species, possesses a variety of pool and bog forms.

The summer of 1950, during which these collections were made, was scarcely representative; colder and wetter than usual, it might have favored moisture-loving species.

Abbreviations and Definitions for the List.

HtFL — Hatton fine sandy loam
ChSL — Chaplin sandy loam
ChGL — Chaplin gravelly loam.
HrLL — Haverhill light loam
HrL — Haverhill loam
HrCL — Haverhill clay loam
EcC — Echo clay
ScHvC — Sceptre heavy clay

When a specific place is given, that plant has not been found elsewhere.

* — Plant apparently confined to Besant valley.

The environment "field pot-holes" comprises small sloughs in tilled fields impossible to sow in the spring for excess of moisture.

PTERIDOPHYTA

OPHIOGLOSSACEAE

**Botrychium Lunaria* (L.) Sw. Shady bank in poplar bluff, SW¼ 29-17-29 W. 2nd.

POLYPODIACEAE

Cystopteris fragilis Bernh. Not scarce in shady coulée bottoms.

EQUISETACEAE

**Equisetum affine* Engelm. Sometimes found in wet sand along Besant creek.

E.arvense L. Occasionally found in wet sand.

E.kansanum J. H. Schaffner. Common in dry sand and bottoms of blow-outs.

SELAGINELLACEAE

Selaginella densa Rydb. Very common in dry places.

MONOCOTYLEDONES

TYPHACEAE

Typha latifolia L. Occasionally found in marshes.

SPARGANIACEAE

**Sparganium multipedunculatum* (Morong) Rydb. Not rare in oxbow ponds along Besant creek.

S.eurycarpum Engelm. Common in marshes and permanent sloughs.

JUNCAGINACEAE

Triglochin maritima L. Common in alkali flats.

T.palustris L. Not rare around springs.

ALISMACEAE

Alisma Geyeri Torr. Slough bottom, S.E. corner N.W. ¼ 21-17-1 W. 3rd.

A.Plantago-aquatica L. var. *brevipes* (Greene) Samuelsson. Common in sloughs.

Sagittaria cuneata Sheldon. Occasionally found in sloughs.

ZANNICHELLIACEAE

**Potamogeton foliosus* Raf. Pools, Besant valley.

P.gramineus L. Large shallow fresh-water slough, W. edge N.E. ¼ 9-17-1 W. 3rd.

**P.interior* Rydb. Oxbow lake, S.E. ¼ 30-17-29 W. 2nd.

**P. Richardsonii* (Benn) Rydb. Oxbow lake, S.E. ¼ 30-17-29 W. 2nd. Leaves heavily coated with $CaCO_3$.

Zannichellia palustris L. Common in alkaline and ferruginous pools and springs.

GRAMINEAE

**Agropyron albicans* Scribn. & Smith. Moist brushy flat, S.W. ¼ 30-17-29 W. 2nd.

A.cristatum (Schreb.) Gaertn. Used for regrassing drifted sandy soil; plentifully escaped.

A.dasystachyum (Hook.) Scribn. Common.

A.repens (L.) Beauv. Occasionally found in low ground.

A.Smithii Rydb. Our commonest grass.

A.trachycaulum (Link) Malte var. *typicum* Fern. Very common.

A.trachycaulum (Link) Malte var. *unilaterale* (Cassidy) Malte. Common in moist saline meadows, associating with *Zygadenus elegans.*

Agrostis alba L. Occasionally found in moist places.

A.exarata Trin. Dark moist bank, coulée botton, S.W. corner S.E. ¼ 5-17-29 W. 2nd.

A.scabra Willd. Common in field pot-holes and abandoned fields.

Alopecurus aequalis Sobol. Occasionally found in slough bottoms on the Coteau.

A.geniculatus L. Common in slough bottoms, chiefly on HtFL.

Andropogon scoparius Michx. Common in moist sandy meadows, associated with *Zygadenus elegans;* occasionally found half-way up the east sides of hills.

Avena fatua L. A common weed in wet seasons, such as 1950.

A.Hookeri Scribn. Occasionally found at the heads of coulées.

Beckmannia Syzigachne (Steud.) Fern. Very common in sloughs.

Bouteloua gracilis (H.B.K.) Lag. Very common on dry prairie.

Bromus anomalus Rupr. Occasionally found among brush.

B.ciliatus L. Fairly common in coulées and among brush.

B.inermis Leyss. Common; escaped from cultivation.

Calamagrostis inexpansa. A. Gray. Common on low ground.

C.montanensis Scribn. Not rare in sandy soil.

Calamovilfa longifolia (Hook.) Hack. Very common on sand.

Catabrosa aquatica (L.) Beauv. Spring at coulée head, N.W. ¼ 15-16-1 W. 3rd.

Danthonia californica Boland var. *americana* (Scribn.) Hitchc. Moist prairie at coulée head, N.W. ¼ 15-16-1 W. 3rd.

Deschampsia caespitosa (L.) Beauv. Common in moist ground.

Distichlis stricta (Torr.) Rydb. Very common.

Echinochloa Crus-Galli (L.) Beauv. Occasionally found in field pot-holes.

Elymus canadensis L. Common; chiefly in sandy soil.

E.Macounii Vasey. Rare; found in grassy slough bottoms.

E.virginianus L. Not rare in bluffs.

**Glyceria borealis* (Nash) Batchelder. Quiet reach of Besant creek. S. E. cor. S. ½ 25-17-30 W. 2nd.

G.grandis S. Wats. Occasionally found in sloughs on the Coteau.

G.striata (Lamb.) Hitchc. Occasionally found in bogs.

Hierochloë odorata (L.) Wahl. Common in sandy meadows.

Hordeum jubatum L. Very common, especially in low ground.

Koeleria cristata (L.) Pers. Very common on all soils.

Muhlenbergia asperifolia (Nees & Meyen) Parodi. Common in alkaline sandy soil.

M.cuspidata (Torr.) Rydb. Common on hillsides.

M.racemosa (Michx.) B.S.P. Occasionally found in moist ground among brush. Accompanies *Bromus ciliatus.*

M.squarrosa (Trin.) Rydb. Common on low sandy prairie.

Oryzopsis hymenoides (R. & S.) Ricker. Common on old sand dunes.

**O.micrantha* (Trin. & Rupr.) Thurb. Among brush on the N. slope of a sand ridge, S.W. ¼ 29-17-29 W. 2nd.

Panicum capillare L. var. *occidentale* Rydb. Wet sand of dike around artificial lake, S.E. ¼ 35-17-29 W. 2nd (Caron settling basin).

Phalaris arundinacea. L. Occasionally found in wet meadows.

Phleum pratense L. Sometimes found in moist ground.

Poa Canbyi (Scribn.) Piper. Common on low prairie.

P.Cusickii Vasey. Common on dry prairie.

P.interior Rydb. }
P.palustris L. } Relative abundance not estimated; jointly common.
P.pratensis L. }

P.secunda Presl. Occasionally found on dry prairie.

Puccinellia Nuttalliana (Schultes) Hitchc. Common on alkaline and burn-out flats.

Schedonnardus paniculatus (Nutt.) Trel. Not uncommon on dry hardpan flats.

Setaria viridis (L.) Beauv. Very common weed in sandy fields.

Spartina gracilis Trin. Rather common on saline prairie.

S.pectinata Bosc. Occasionally found in wet places; common in Besant valley.

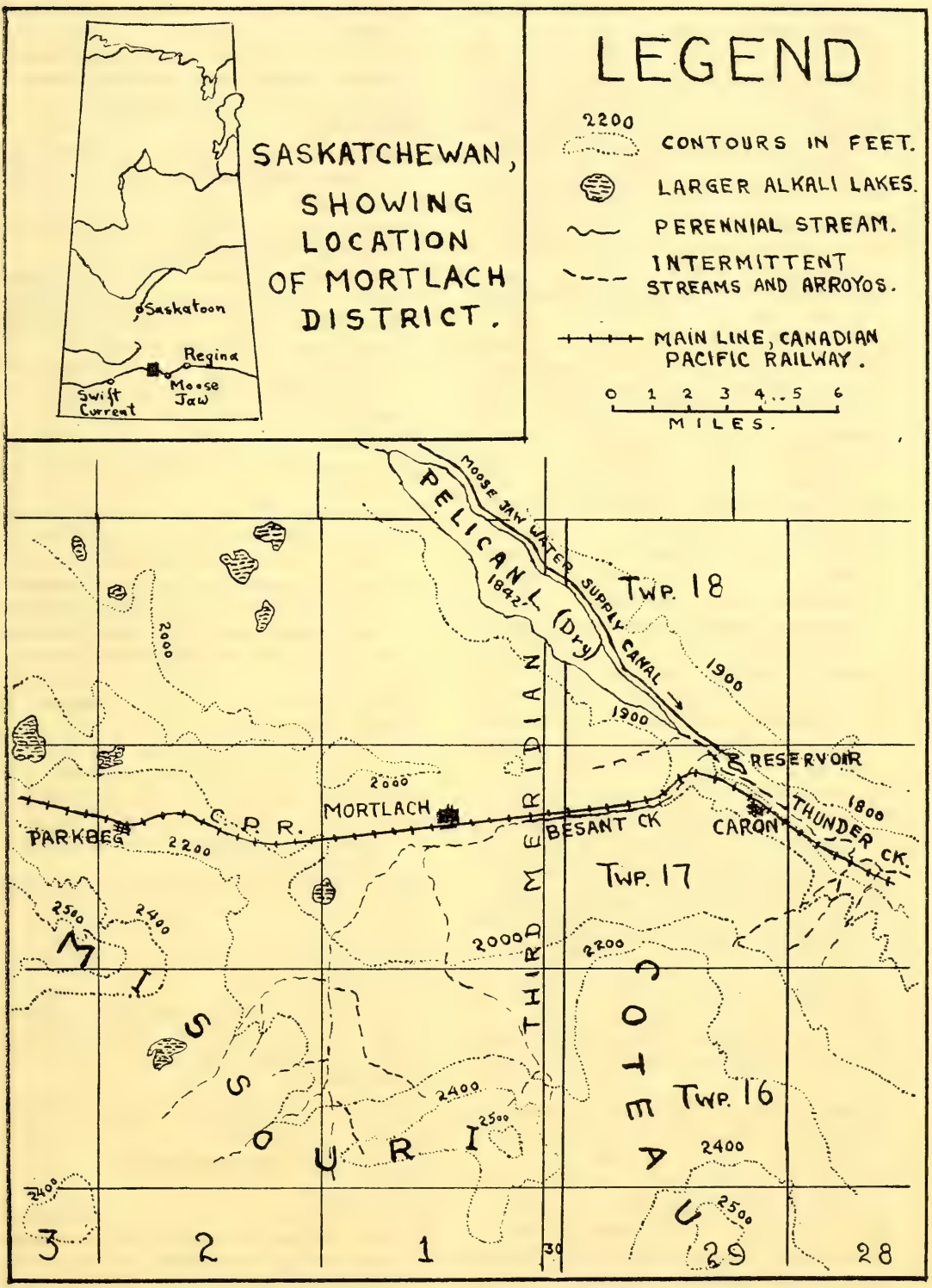

Fig. 1. Map of the Mortlach District, southern Saskatchewan.

Sphenopholis obtusata (Michx.) Scribn. Occasionally found on low prairie and faintly alkaline flats.

Sporobolus cryptandrus (Torr.) A. Gray. Common in sand.

Stipa comata Trin. & Rupr. Very common.

S.spartea Trin. var. *curtiseta* Hitchc. Common only on the Coteau southeast of Mortlach.

S.viridula Trin. Common on the Coteau.

CYPERACEAE

Carex aenea Fern. Not uncommon on HtFL in low spots.

**C.aquatilis* Wahl. Common in bogs along Besant creek.

C.atherodes Spreng. Common in sloughs.

**C.aurea* Nutt. Moist sandy meadow by creek, S.E. cor. S. ½ 25-17-30 W. 2nd.

C.brevior Mack. Occasionally found in low spots.

C.Douglasii Boott. Common in saline meadows.

C.Eleocharis Bailey. Very common on dry prairie.

C.filifolia Nutt. Very common on dry hillsides.

C.heliophila Mack. Common.

C.lanuginosa Michx. Sometimes found in old blow-outs excavated down to the water table.

C.obtusata Liljebl. Found around the edges of brush clumps.

C.praegracilis W. Boott. Common on moist prairie.

C.rostrata Stokes. Common in sloughs.

C.scirpiformis Mack. Slightly alkaline alluvial flat, S.E. ¼ 21-17-1 W. 3rd.

C.Sprengelii Dewey. Common in bluffs.

C.sychnocephala Carey. Around a pool, in the ditch of an abandoned railway grade, S.E. corner N.E. ¼ 29-17-1 W. 3rd.

C.tenera Dewey. Moist shady bank, coulée bottom, S.W. cor. S.E. ¼ 5-17-2 W. 2nd.

C.Torreyi Tuckerm. Moist soil among bushes, coulée bottom; N.W. ¼ 10-17-2 W. 3rd.

Cyperus inflexus Muhl. Alluvial flat, probably a delta, along slough shore; W. edge N.E. ¼ 9-17-1 W. 3rd.

Eleocharis acicularis (L.) R. & S. Very common in field pot-holes.

E.palustris (L.) R. & S. Very common.

**Eriophorum angustifolium* Roth. Bog, S. edge S.W. ¼ 25-17-1 W. 3rd.

Scirpus americanus Pers. Common.

S.paludosus A. Nels. Common in alkali lakes; covers the bottom of lake Johnstone.

S.rubrotinctus Fern. Occasionally found; prefers fresher water than the others.

S.validus Vahl. Fairly common.

LEMNACEAE

Lemna minor L. Common in springs, and in pools along Besant valley.

JUNCACEAE

Juncus balticus Willd. var. *montanus* Engelm. Very common.

J.bufonius L. Common in muddy places.

J.Dudleyi Wieg. Common around sloughs.

**J.longistylis* Torr. Common along the boggy banks of Besant creek.

**J.nodosus* L. Common in Besant bogs.

J.Torreyi Coville. By a grassy pool, E. edge N.E. ¼ 26-17-29 W. 2nd.

LILIACEAE

Allium textile Nels. & Macbr. Common on prairie.

Disporum trachycarpum S. Wats. Rare; found only in the most heavily wooded coulées southeast of Mortlach.

Lilium philadelphicum L. var. *andinum* (Nutt.) Ker. Not rare; associates with *Zygadenus elegans*. The year 1950 was the best season for this species in a long time.

Smilacina stellata (L.) Desf. Common in moist places.

Similax herbacea L. var. *lasioneuron* (Hook.) A.D.C. Not rare in bluffs.

Zygadenus elegans Pursh. Common in moist saline sandy meadows; the most conspicuous of the many species peculiar to such places.

Z.gramineus Rydb. Common on not too dry prairie on the Coteau.

IRIDACEAE

Sisyrinchium angustifolium Mill. Common on moist prairie.

S.mucronatum Michx. Not rare; associates with *Zygadenus elegans;* needs moister ground than *S.angustifolium*.

ORCHIDACEAE

**Habenaria hyperborea* Coult. In only the wettest bogs of Besant valley.

DICOTYLEDONES

SALICACEAE

**Populus balsamifera* L. Scarce. Two records from the eastern part of Besant valley, mixed with *P.tremuloides* on sandy soil.

P.Sargentii Dode. Not rare on sandy soil with high water table.

P.tremuloides Michx. Common and increasing. Bluffs are springing up around sloughs on the Coteau. This increase is probably due to the absence of prairie fires since settlement. If there has been any climatic shift at all in late decades, it has been a drying trend, unfavorable to trees.

Salix Bebbiana Sarg. Common.

**S.candida* Flügge. Bogs along Besant creek.

S.discolor Muhl. Common.

S.interior Rowlee. The common willow on sandy soil. Leaves vary much in pubescence.

S.lutea Nutt. Common.

S.petiolaris Smith. Common.

URTICACEAE

Parietaria pennsylvanica Muhl. Common in shady thickets.

Urtica procera Muhl. Common Nettle. Common on moist rich soil.

SANTALACEAE

Comandra pallida A.D.C. Common on dry prairie.

POLYGONACEAE

Eriogonum flavum Nutt. Common on dry eroded hillsides.

Polygonum achoreum Blake. Common around dwellings.

P.aviculare L. Found as a street weed in Mortlach.

P.coccineum Muhl. forma *terrestre* (Willd.) Stanford. Very common in sloughs.

P.Convolvulus L. Common field weed.

P.lapathifolium L. Occasionally found in field pot-holes. Perianth ranges in color from deep rose to white.

P.natans A. Eat. forma *genuinum* Stanford. Shallow pool, N.E. corner N.E. ¼ 26-17-29 W. 2nd.

P.natans A. Eat. forma *Hartwrightii* (Gray) Stanford. Sometimes found in moist sand.

P.neglectum Besser. Very common weed; often found on dry clay flats.

P.ramosissimum Michx. Common in sandy soil and slough bottoms.

P.tomentosum Schrank. Field pot-hole, HtFL; S.W. cor. N.W. ¼ 28-17-1 W. 3rd.

Rumex crispus L. Wet sand flat, shore of Caron settling basin, S.E. ¼ 35-17-29 W. 2nd.

R.mexicanus Meissn. Common in low places.

R.occidentalis S.Wats. Fairly common in slough bottoms.

R.maritimus L. var. *fueginus* (Phil.) Dusen. Common in field pot-holes.

R.venosus Pursh. Common in sandhills.

CHENOPODIACEAE

Atriplex argentea Nutt. Confined to burn-out flats, EcC.

A.hortensis L. A street weed in Mortlach which has appeared of late years.

A.Nuttallii S.Wats. Common on dry prairie and burn-out flats.

A.patula L. ssp. *hastata* (L.) Hall & Clements. Very common on saline soil and burn-out flats.

Axyris amaranthoides L. Very common weed.

Chenopodium album L. Very common weed.

C.Fremontii S.Wats. Not rare among brush on sandhills.

**C.gigantospermum* Aellen. Moist sandy meadow, burnt over in the spring, S.W. ¼ 29-17-29 W. 2nd.

C.glaucum L. ssp. *salinum* (Standl.) Aellen. Common in alkali flats.

C.leptophyllum Nutt. Common weed on HtFL.

C.rubrum L. Common around alkali lakes.

Corispermum villosum Rydb. Common in sand.

Eurotia lanata (Pursh). Moq. Fairly common on dry prairie.

Kochia trichophylla Stapf. A street weed.

Monolepis Nuttalliana (Schultes) Greene. A common weed.

Salicornia rubra. A. Nels. Common on the saline deposits of dry alkali lakes.

Salsola Pestifer A. Nels. Exceedingly common weed in grain fields.

Suaeda depressa (Pursh) S.Wats. Occasionally found on alkali flats. Its variety *erecta* is much more abundant in such places.

AMARANTHACEAE

Amaranthus blitoides S. Wats. Common.

A.graecizans L. Common.

A.retroflexus L. Very common weed.

NYCTAGINACEAE

Oxybaphus hirsutus Pursh. Quite common in sandy soil, the var. *pilosus* predominating.

O.nyctagineus (Michx.) Sweet. Gravel fill of the C.P.R. main line, W.edge N.E. ¼ 21-17-1 W. 3rd.

PORTULACACEAE

Portulaca oleracea L. A troublesome garden weed, HtFL.

CORRIGIOLACEAE

Paronychia sessiliflora Nutt. Common on eroded hillsides.

CARYOPHYLLACEAE

Arenaria lateriflora L. Common in poplar bluffs.

Cerastium campestre Greene. Common on low prairie.

C.vulgatum L. Lawn weed in Mortlach.

Gypsophila paniculata L. Street weed in Mortlach.

Lychnis Drummondii S.Wats. Widespread but not common on prairie.

Saponaria Vaccaria L. A secondary weed in grain fields.

Silene Cserei Baum. Sandy cutbanks and railway grade, N.W. cor. N.E. ¼ 24-17-1 W. 3rd. A recent arrival in Saskatchewan.

Spergularia salina J. & C. Presl. Not rare on strongly alkaline clay flats.

Stellaria longifolia Muhl. Bogs.

S.longipes Goldie. Moist places; commoner than *S. longifolia.*

S.media (L.) Cyrill. A garden weed in moister climates; too dry here. One colony found in a coulée, formerly the site of a ranch.

CERATOPHYLLACEAE

**Ceratophyllum demersum* L. Pools along Besant creek.

RANUNCULACEAE

**Actea rubra* (Ait.) Willd. Scattered in brush along Besant creek. The form *neglecta* (Gillman) Robinson with white berries also occurs.

Anemone canadensis L. Very common on moist prairie.

A.cylindrica A. Gray. Not rare on moist prairie.

**Clematis ligusticifolia* Nutt. Among saskatoons, moist sandy hillside, S.W. ¼ 29-17-29 W. 2nd.

Myosurus lepturus (A. Gray) Howell. Occasionally found around sloughs.

M.minimus L. Around sloughs and on mud flats.

Pulsatilla ludoviciana (Nutt.) Heller. Very common on dry prairie.

Ranunculus abortivus L. Moist shady bank, coulée bottom, S.W. corner S.E. ¼ 5-17-29 W. 2nd.

R. Cymbalaria L. Very common on all moist muddy places, saline or not.

R.glaberrimus Hook. Moist prairie at coulée head, N.E. ¼ 3-17-2 W. 3rd.

R.Gmelini DC. Sparsely found in sloughs, commoner in oxbow pools of Besant valley.

R.Macounii Britt. Not rare, especially on the Coteau.

R.ovalis Raf. Common around sloughs.

R.sceleratus L. Bog, N. edge N.E. ¼ 24-17-1 W. 3rd.

R.trichophyllus Chaix. Commoner than *R.Gmelini.*

**Thalictrum dasycarpum* Fisch & Lall. Among brush in moist soil, S.W. ¼ 29-17-29 W. 2nd.

T.venulosum Trelease. Common around bluffs.

FUMARIACEAE

**Corydalis aurea* Willd. Common in Besant valley.

CRUCIFERAE

Alyssum alyssoides L. A few plants found along the railway grade, N.W. ¼ 22-17-1 W. 3rd.

Arabis divaricarpa A. Nels. Not rare on hills.

A.hirsuta (L.) Scop. var. *pycnocarpa* (Hopkins) Rollins. Occasionally found on slightly saline flats.

A.Holboellii Hornem. var. *retrofracta* (Grah.) Rollins. Very common.

Arabidopsis glauca (Nutt.) Rydb. Not rare around alkaline sloughs in sandy soil.

Berteroa incana (L.) D.C. A few plants found along the highway, S. ½ 25-17-30 W. 2nd.

Brassica juncea (L.) Cosson. An occasional roadside weed, mostly on HrCL.

Capsella Bursa-pastoris (L.) Medic. A lawn weed in Mortlach.

Conringia orientalis (L.) Dum. Common weed.

Draba nemorosa L. var. *leiocarpa* Lindb. Not rare on low ground.

D.nemorosa L. var. *nemorosa.* Meadow at coulée bottom, N.E. cor. N.E. ¼ 7-16-1 W. 3rd.

Erysimum asperum D.C. Common on sandy soil.

E.cheiranthoides L. Confined to coulées and creek bottoms.

E.parviflorum Nutt. Common.

Lepidium densiflorum Schrad. Common weed.

L.ramosissimum A. Nels. Street weed, found around ash piles in Mortlach.

Lesquerella arenosa (Richards.) Rydb. Common on very sandy ground.

Rorippa palustris (L.) Besser. Common in field pot-holes.
Sinapis arvensis L. Not common except on heavy clay soil.
Sisymbrium altissimum L. Extremely abundant weed.
Sophia filipes (A.Gray) Heller. Uncommon weed.
S.multifida Gilib. Very common weed.
S.Richardsoniana (Sweet). Rydb. Common only in coulées and among brush.
Thlaspi arvense L. Very common weed in fields.

CAPPARIDACEAE

Cleome serrulata Pursh. Very common in sandy soil.
**Polanisia graveolens* Raf. Eroded cutbank, coarse red sand; N. edge N.E. ¼ 24-17-1 W. 3rd.
**P.trachysperma* T. & G. Coarse red sand, bank of gravel pit, N. edge N.W. ¼ 24-17-1 W. 3rd. Doubtful; may be overgrown specimens of *P.graveolens*.

SAXIFRAGACEAE

Heuchera Richardsonii R.Br. Common.
Parnassia palustris L. Common in bogs, especially along Besant creek.
Ribes aureum Pursh. Escaped from cultivation in our area; well established on sandy soils.
R.floridum L'Her. Sparsely distributed in coulées.
R.setosum Lindl. Common in moist places.

ROSACEAE

Agrimonia striata Michx. Occasionally found among brush.
Amelanchier alnifolia Nutt. Very common in coulées.
Chamaerhodos Nuttallii Pickering. A dominant where there is no topsoil.
Crataegus chrysocarpa Ashe. Common.
Fragaria glauca (S.Wats.) Rydb. Not rare on most prairie. Seldom bears fruit.
Geum strictum Soland. Common in moist places.
G.triflorum Pursh. Very common on prairie.
Potentilla Anserina L. Very common. The typical and the form *sericea* intergrade.
P.arguta Pursh. Common.
P.bipinnatifida Doug. Not rare on HtFL.
P.camporum Rydb. Common in moist draws.
P.concinna Richards. Common on dry hills.
P.effusa Dougl. Rare; found on dry prairie, HrL, N.W. ¼ 10-17-2 W 3rd.
P.flabelliformis Lehm. Occasionally found on moist prairie.
P.Hippiana Lehm. Not rare on dry prairie.
P.millegrana Engelm. Common in field pot-holes.
P.norvegica L. Common weed in moist soil.
P.paradoxa Nutt. Moist sand, shore of Caron settling basin, S.W. ¼ 35-17-29 W. 2nd.
P.pennsylvanica L. Common on HtFL.
P.plattensis Nutt. Common on alkali alluvial flats.
P.recta L. Moist prairie in draw, S.E. ¼ 30-16-29 W. 2nd.
Prunus pennsylvanica L.f. Rare. One coulée, S.W. cor. S.E. ¼ 5-17-29 W. 2nd.
P.virginiana L. var. *melanocarpa* (A. Nels.) Sarg. Common on sandy soil.
Rosa acicularis Lindl. Sometimes found in coulées.
R.alcea Greene. Very common, especially on till soils.
R.Macounii Greene. Common in coulées, and more so on sandy soil.
Rubus strigosus Michx. Common in coulées.

LEGUMINOSAE

Astragalus adsurgens Pall. Common in dry places.
A.bisulcatus (Hook.) A. Gray. Very common. Occurs in solid stands along the north shore of Lake Johnstone.
A.canadensis L. Occasionally found on moistish prairie.
A.flexuosus (Hook.) Dougl. Common on low prairie on the Coteau.
A.hypoglottis L. Common in low places.
A.lotiflorus Hook. Sometimes found on gravelly or very sandy soil.
A.missouriensis Nutt. Occasionally found on the dry sides of coulées.
A.pectinatus (Hook.) Dougl. Very common in dry places.
A.succulentus Richards. Common.
A.tenellus Pursh. Found on coulée walls.
A.triphyllus Pursh. Common in very dry places.
Glycyrrhiza lepidota Nutt. Common on low prairie.
Hedysarum boreale Nutt. var. *cinerascens* (Rydb.) Rollins. Fairly common on coulée walls.
Lupinus pusillus Pursh. Very sandy soil, W. edge S.W. ¼ 30-17-29 W. 2nd.
Medicago sativa L. Sparsely escaped.

Melilotus alba Desv. Very common on sandy soil and old blow-outs.
M.officinale (L.) Lamb. Not nearly so abundant as *M.alba.*
Oxytropis Macounii (Greene) Rydb. Common on dry prairie.
Petalostemon candidus (Willd.) Michx. Found chiefly on gravelly ground.
P.purpureus (Vent.) Rydb. Common in dry places.
Psoralea argophylla Pursh. Common on HtFL.
P.esculenta Pursh. Occurs on coulée walls, with *Lomatium macrocarpum.*
Thermopsis rhombifolia (Nutt.) Richards. Very common.
Trifolium repens L. Sometimes found on wet sand, mostly along Besant creek.
Vicia americana Muhl. Among brush in coulées.
V.sparsifolia Nutt. Common on dry ground. Leaflets variable in width.
V.trifida Dietr. Sometimes found on low prairie.

OXALIDACEAE

Oxalis stricta L. Abundant in field potholes, HtFL.

LINACEAE

Linum compactum A. Nels. Clay hardpan flat, E.edge S.E. ¼ 26-16-1 W. 3rd.
L.Lewisii Pursh. Common on prairie, especially on the Coteau.
L.rigidum Pursh. Sparsely found in very sandy soil.

EUPHORBIACEAE

Euphorbia Esula L. Noxious weed; increasing rapidly.
E.glyptosperma Engelm. An annoying garden weed in HtFL. Ripe specimens from gardens in Mortlach all turned out to be *glyptosperma,* although *E.serpyllifolia* ought also to grow in the district.

CALLITRICHACEAE

Callitriche autumnalis L. Common in the canal filling the Caron saturation area. Seen in one dug-out.
C.palustris L. Common in pools and dug-outs.

ANACARDIACEAE

Rhus radicans L. var. *Rydbergii* (Small) Rehder. Very common in the brushy sandhills along Besant creek; found to some extent in coulées.

ACERACEAE

Acer Negundo L. var. *interius* (Britt.) Sarg. Common in coulées and Besant valley.

MALVACEAE

Malva parviflora L. Street weed in Mortlach.
M.rotundifolia L. Garden weed on one farm, S.W. ¼ 9-16-2 W. 3rd. Introduced in garden seed.
Malvastrum coccineum (Pursh) A. Gray. Common on prairie.

ELATINACEAE

Elatine americana (Pursh) Arn. Found occasionally in and around sloughs and dug-outs, in both forms.

VIOLACEAE

Viola adunca Smith. Common on the Coteau.
V.nephrophylla Greene. Common in bogs.
V.Nuttallii Pursh. Not common, but to be found on dry coulée walls.
V.rugulosa Greene. Common in bluffs.
V.subvestita Greene. Very common on low sandy prairie. Probably not indistinct from *V.adunca.*
V.vallicola A. Nels. Common on moist prairie, HtFL.

CACTACEAE

Mamillaria vivipara (Nutt.) Haw. Common.
Opuntia polyacantha Haw. Common.

ELEAGNACEAE

Eleagnus commutata Bernh. Very common on sandy soil.
Shepherdia argentea Nutt. Not rare.

ONAGRACEAE

Boisduvallia glabella (Nutt.) Walp. Gumbo flat, in association with *Navarretia minima,* S.W. corner S.W. ¼ 3-17-1 W. 3rd.
Epilobium adenocladon (Haussk.) Rydb. Common on HtFL.
E.augustifolium L. Common.
E.glandulosum Lehm. var. *adenocaulon* (Haussk.) Fern. Common in sloughs and bogs.
**E.lineare* Muhl. Occasionally found in bogs along Besant creek.
Gaura coccinea Pursh. Common on dry prairie.
Oenothera biennis L. Common, chiefly on sandy soil.
O.caespitosa Nutt. var. *montana* (Nutt.) Durand. Found on one eroded hillside of bare boulder clay, N.E. cor. S.E. ¼ 12-16-2 W. 3rd.
O.flava (A. Nels.) Munz. Not rare in clayey slough bottoms in fields.
O.pallida Lindl. Confined to sandy soil.
O.serrulata Nutt. Not rare in dry soil.

HALORAGIDACEAE

Hippuris vulgaris L. Oxbow pools along Besant creek.

**Myriophyllum exalbescens* Fern. Pools along Besant creek.

ARALIACEAE

Aralia nudicaulis L. Heavy woods in a deep coulée, N.W. ¼ 12-16-1 W. 3rd.

UMBELLIFERAE

Cicuta Douglasii (D.C.) Coult & Rose. Not rare in bogs and marshes.

Cymopterus acaulis (Pursh) Rydb. Common on gravelly ground; especially so on the gravelly strip along the north side of Pelican lake, ChGL.

Heracleum lanatum Michx. Common in coulées.

Lomatium macrocarpum (H.&A.) Coult. & Rose. Common on the moist prairie just above the brush line in coulées.

L.villosum Raf. Scarce. Found abundantly in only one coulée.

Musineon divaricatum (Pursh) Nutt. Common on dry hills on the Coteau.

Osmorrhiza longistylis (Torr.) D.C. Occasionally found in dark woods at the bottoms of the deep coulées south-east of Mortlach.

Pastinaca sativa L. Occasionally found escaped in wet ground.

Sium suave Walt. Common in sloughs.

Zizia aptera (A. Gray) Fern. Common in moist meadows.

CORNACEAE

Cornus stolonifera Michx. Common in brush in coulées.

PYROLACEAE

**Pyrola asarifolia* Michx. Found in wet sandy soil along Besant creek.

PRIMULACEAE

Androsace occidentalis Pursh. Not rare in bottoms of blowouts.

A.septentrionalis L. var. *puberulenta* (Rydb.) Knuth. Common.

Dodecatheon pauciflorum (Durand) Greene. Accompanies *Zygadenus elegans.*

Glaux maritima L. Common in sandy alkaline flats.

Lysimachia ciliata L. Not rare in wet meadows.

**Primula incana* M.E. Jones. Bogs along Besant creek.

OLEACEAE

Fraxinus campestris Britt. One coulée, S.W. corner S.E. ¼ 5-17-29 W. 2nd.

GENTIANACEAE

Gentiana affinis Griseb. Common in moist places, even around alkaline springs. A white-flowered form was found in a moist saline meadow, S. edge S.E. ¼ 25-17-1 W. 3rd.

**G.Fremontii* Torr. [*Chondrophylla Fremontii* (Torr) A. Nels.] Moist, sandy, slightly saline meadow by creek, S.E. corner S. ½ 25-17-30 W. 2nd. Not previously recorded from Saskatchewan.

G.strictiflora (Rydb.) A.Nels. Not rare in moist saline meadows.

**G.tonsa* (Lunell) Vict. Sparsely found in bogs along Besant creek.

**Pleurogyne rotata* Griseb. Slightly saline bog, N.edge N.W. ¼ 24-17-1 W. 3rd.

APOCYNACEAE

Apocynum androsaemifolium L. Sparsely found among buckbrush in coulées.

A.sibiricum Jacq. Occasional clumps found in waste places.

ASCLEPIADACEAE

Acerates viridiflora (Raf.) Eaton. Not rare on sandhills. Variety *linearis* A. Gray was found on a sandhill, W. edge S.W. ¼ 30-17-29 W. 2nd.

CONVOVULACEAE

Convolvulus interior House. Common field weed on tilled fields, EcC, at foot of Coteau.

C.sepium L. var. *americanus* Sims. Among brush in coulée, N.W. corner N.W. ¼ 8-16-1 W. 3rd.

Cuscuta curta (Engelm.) Rydb. Rare, but commoner than *C.Gronovii.* Parasitic mostly on *Solidago* in moist draws.

C.Gronovii Willd. Coulée, N.W. cor. N.E. ¼ 32-16-29 W. 2nd. Parasitic on several different plants.

POLEMONIACEAE

Collomia linearis Nutt. Common on moist prairie, dry prairie, and abandoned farmyards.

Navarretia minima Nutt. Uncommon; slough bottoms.

Phlox Hoodii Richards. Very common on dry prairie.

HYDROPHYLLACEAE

**Ellisia Nyctelea* L. Fireguards and disturbed earth in Besant valley.

BORAGINACEAE

Allocarya californica (F.&M.) Greene. Very common in slough bottoms in tilled fields; often dominant there.

Cryptantha Fendleri (A.Gray) Greene. Very common on old sand dunes.

Hackelia floribunda (Lehm.) Johnst. Common in bluffs.

Heliotropium curassavicum L. var. *obovatum* DC. Not rare around sandy alkali pot-holes. Common at the upper end of Pelican lake.

Lappula echinata Gilib. Common weed.

L.Redowskii (Hornem.) Greene var. *occidentalis* (Wats.) Rydb. A weed of light soil.

Lithospermum angustifolium Michx. Common on prairie, HtFL.

Oreocarya glomerata (Pursh) Greene. Common on dry hills.

VERBENACEAE

Verbena bracteosa Michx. Common on HtFL; sometimes a field weed.

LABIATAE

Agastache anethiodora (Nutt.) Britt. Among brush in deep coulée, S.W. corner S.E. ¼ 5-17-29 W. 2nd.

**Lycopus americanus* Muhl. Bogs along Besant creek.

L.asper Greene. Common in wet places.

Mentha arvensis L. var. *glabrata* (Benth.) Fern. Very common in low places.

**Moldavica parviflora* (Nutt.) Britt. Rich soil among brush, Besant valley.

Monarda fistulosa L. var. *menthaefolia* (Graham) Fern. Common in coulées southeast of Mortlach.

**Scutellaria epilobifolia* A. Hamilt. Confined to the banks of Besant creek.

Stachys palustris L. var. *pilosa* (Nutt.) Fern. Common in low ground.

SOLANACEAE

Solanum triflorum. Nutt. Common on bare ground, notably around gopher holes.

SCROPHULARIACEAE

Gratiola neglecta Torr. Sometimes found in field pot-holes.

Limosella aquatica L. Occasionally found on mudflats.

Linaria vulgaris Mill. This weed is increasing on light soils.

Orthocarpus luteus Nutt. Common on low prairie.

Pentstemon albidus Nutt. Common on dry prairie.

P.gracilis Nutt. Common on prairie.

P.nitidus Dougl. Fairly common in arid places.

P.procerus Dougl. Common on moist prairie.

Scrophularia lanceolata Pursh. By abandoned railway grade, HtFL; S.E. cor. N.E. ¼ 29-17-1 W. 3rd. Clump covers about 1000 sq.yd.

Veronica peregrina L. var. *xalapensis* (H.B.K.) Pennell. Very common in field pot-holes and moist ground, accompanying *Allocarya californica*.

V.scutellata L. Very rare. Only two colonies seen, 20 miles apart.

LENTIBULARIACEAE

**Utricularia vulgaris* L. var. *americana* Gray. Quiet oxbow pools along Besant creek.

OROBANCHACEAE

Orobanche fasciculata Nutt. Common wherever the Artemisias grow.

O.ludoviciana Nutt. Not rare in sandy soil.

PLANTAGINACEAE

Plantago eriopoda Torr. Common in alkaline ground.

P.major L. Common in moist places.

RUBIACEAE

Galium boreale L. Very common on moist prairie.

**G.trifidum* L. Bogs along Besant creek.

**G.triflorum* Michx. Common in wet shady places in Besant valley.

**G.Vaillantii* D.C. Shady clumps of brush on a sandy hillside, S.W. ¼ 29-17-29 W. 2nd.

CAPRIFOLIACEAE

Lonicera glaucescens Rydb. Rare.

L.tatarica L. One bush along Besant creek; escaped from cultivation.

Symphoricarpos albus (L.) Blake. Brushy bank of coulée, N.W. cor. N.E. ¼ 32-16-29 W. 2nd.

S.occidentalis Hook. Excessively common.

CUCURBITACEAE

Echinocystis lobata T. & G. Found among weeds in rich soil, in shelter of a long deserted farmhouse, S.W. ¼ 30-16-29 W. 2nd.

CAMPANULACEAE

Campanula rotundifolia L. Common on prairie.

AMBROSIACEAE

Ambrosia artemisaefolia A. Gray. Roadside, HtFL; N.E. cor. N.E. ¼ 28-17-29 W. 2nd.

A.psilostachya D.C. var. *coronopifolia* (T. & G.) Farwell. Summer-fallow weed, HtFL; S.E. ¼ 27-17-1 W. 3rd.

Iva axillaris Pursh. Characteristic weed of EcC soils under cultivation.

I.xanthifolia Nutt. Common weed of waste places.

Xanthium echinatum Murr. Common on alkaline alluvial flats.

CICHORIACEAE

Agoseris glauca (Nutt.) Greene. Common on moist prairie.

A.scorzoneraefolia (Schrad.) Greene. Predominates over *A.glauca* on the Coteau.

Crepis perplexans Rydb. Associates with *Zygadenus elegans.*

Hieracium scabriusculum Schwein. Scarce; among brush in coulées.

Lactuca pulchella (Pursh) DC. A common weed.

L.Scariola L. Common weed. The form *integrifolia* (Bogenh.) S. Beck makes about half of the population.

Lygodesmia juncea (Pursh) D.Don. Common in dry places.

L.rostrata A. Gray. Found in coarse loose red sand, E. edge N.E. ¼ 18-17-29 W. 2nd.

Sonchus arvensis L. Scarce except in Besant valley.

Taraxacum officinale Weber. Abundant weed.

Tragopogon dubius Scop. Common weed.

CARDUACEAE

Achillea lanulosa Nutt. Common on prairie.

Actinea Richardsoni (Hook.) Kuntz. Common on HrL and HrCL prairie; seemingly an indicator for these till soils.

Antennaria microphylla Rydb. Common. Staminate and pistillate colonies appear roughly equal in abundance.

Aplopappus armerioides (Nutt.) A. Gray. On one dry eroded hillside, S.W. corner S.W. ¼ 22-16-1 W. 3rd.

A.lanceolatus T.&G. Not rare on low, sandy, slightly alkaline prairie, associating with *Muhlenbergia squarrosa.*

A.Nuttalli T.&G. Occasionally found on dry ridges.

A.spinulosus (Pursh) D.C. Very common on dry prairie on the Coteau.

Arctium minus Schk. One colony, S.E. cor. N. ½ 36-15-30 W. 2nd.

Arnica fulgens Pursh. Not rare around grassy pot-holes on the Coteau. Alkali-intolerant.

Artemisia Absinthium L. Escaped from garden N.E. ¼ 16-16-2 W 3rd. Well established.

A.biennis Willd. A common weed in low ground.

A.camporum Rydb. Common on sandy soil.

A.cana Pursh. Sparsely found on dry hills.

A.frigida Willd. Excessively common. On prairie, heavy stands indicate overgrazing.

A.gnaphalodes Nutt. Common.

A.pabularis (A.Nels.) Rydb. Common on low prairie.

**Aster adscendens* Lindl. Moist soil among heavy brush, N.W. ¼ 28-17-29 W. 2nd.

A.ericoides L. Very common.

A.junciformis Rydb. Common in bogs and sandy pot-holes.

A.laevis L. Very common.

A.longifolius Lam. Sometimes found in low spots on the Coteau.

A.Osterhoutii Rydb. Common in field pot-holes, sloughs, and ditches.

A.pauciflorus Nutt. Sparsely distributed in sandy, slightly saline meadows.

Bidens glaucescens Greene. Common in wet places.

B.vulgata Greene var. *puberula* (Wieg.) Greene. Found in heavy clay soil, shoulder of graded road through marsh, S.E. cor. S.E. ¼ 13-17-2 W. 3rd.

Brachyactis angusta (Lindl.) Britt. Common in wet saline soil.

Carduus nutans L. One plant, N.E. cor. N.E. ¼ 6-17-29 W. 2nd., roadside.

Chrysopsis villosa (Pursh) Nutt. Very common on light land.

Cirsium arvense (L.) Scop. Sometimes found in low spots.

C.undulatum (Nutt.) Spreng. Common on prairie.

Coreopsis tinctoria Nutt. Found sparingly in field potholes in heavy soil.

Erigeron asper Nutt. Common.

E.canadensis L. A common weed in light soil.

E.glabellus Nutt. Common in low ground.

E.lonchophyllus Hook. Sparingly found in moist, sandy, slightly saline flats.

E.pumilus Nutt. Common on dry hilltops.

Gaillardia aristata Pursh. Common on prairie.

Gnaphalium palustre Nutt. Common in field pot-holes, associated with *Allocarya californica.*

Grindelia perennis A. Nels. Very common on clay flats.

Gutierrezia diversifolia Greene. Very common on dry prairie.

Helenium autumnale L. var. *montanum* (Nutt.) Fern. Common.

**Helianthus giganteus* L. S.E. cor. S.E. ¼ 25-17-1 W. 3rd. Moist saline meadow.

Helianthus lenticularis Dougl. Common on heavy soil.

H.Maximiliani Schrad. Rare on moist prairie.

H.petiolaris Nutt. Common on sandy soil. Some plants have ciliate tegules, approaching the description of *H.aridus* Rydb.

H.subrhomboideus Rydb. Occasionally found on moist saline soil.

Liatris ligulistylis (A.Nels.) Rydb. Not rare. Associates with *Zygadenus elegans*.

Liatris punctata Hook. Common on dry prairie.

Madia glomerata Hook. Sometimes found on heavy soil.

Matricaria matricarioides (Less.) Porter. Street weed in Mortlach.

Ratibida columnaris (Sims). D. Don. Common.

R.columnaris var. *pulcherrima* (D.C.) D. Don. Not rare on the Coteau, though scarce around Mortlach.

Senecio columbianus Greene. Common on moist prairie.

**S.pauperculus* Michx. Bogs along Besant creek.

S.Purshianus Nutt. Not rare on dry hilltops.

Solidago dumetorum Lunell. Common, mostly on heavier soils.

S.gilvocanescens (Rydb.) Smyth. Very common on sandy soil.

S.missouriensis Nutt. Very common.

S.mollis Bartl. Very common; persists in tilled fields.

S.nemoralis Ait. var. *decemflora* (D.C.) Fern. Common in the parkland area 2 miles south of Besant valley — sandy soil with high water table.

S.rigida L. var. *canescens* (Rydb.) Breitung. Common.

S.serotina Ait. Common in moist places.

Townsendia sericea Hook. Not rare in bottoms of blow-outs and dry gravel ridges.

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NOTES AND OBSERVATIONS

The Dickcissel *(Spiza americana)* **on the Outer North Shore of the Gulf St. Lawrence, P.Q.** — At a camp in the lower Moisie River valley, Quebec, on October 5, 1950, three sparrow-like birds were observed foraging on the open ground close to buildings. They were studied at leisure and thought to be Dickcissels.

The following day and again on the 7th these three birds were seen at close quarters as they fed on corn meal along with White-Throated and White-Crowned Sparrows and their identity appeared d e f i n i t e to the writer.

Only two birds were noted in the feeding area on October 8 and 9. It is not known how long they remained near the Moisie River as it was not possible to continue observation after the 9th.

On September 25, 1951, at the same locality, another of these birds appeared and was collected for the National Museum of Canada; it proved to be a Dickcissel. — *J. MITCHELL CAMPBELL, Ottawa, Ont.*

Occurence of two species of fleas on *Peromyscus maniculatus gracilis* (LeConte), **in western Quebec.** — During the summer of 1951, while at the Blue Sea Lake Biological Laboratory, Messines, Quebec, a live juvenile *Peromyscus maniculatus gracilis* (LeConte) was brought into the laboratory. Examination of the specimen revealed a large number of fleas to be present on the animal. Subsequent identification of these fleas revealed them to be:

Orchopeas leucopus (Baker): 15 male, 7 female.

Megabothris quirini (Roths.): 1 male, 2 female.

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